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Wild Sentinels

By ARCHIBALD RUTLEDGE

Illustrated by R. Bruce Horsfall

Some birds and mammals post guards to warn of any intruding enemies

ONE day a Negro came to me to report that he had seen two old wild turkey gobblers in a sandy field near the river. As usual, word of wild game stirred me to action, and I at once accompanied him to the place. I might say that this place is of uncommon historic interest; for this field once belonged to the plantation of Thomas Lynch, Jr., the youngest signer of the Declaration of Independence. The house has long since been in ruins; and all the fields are either overgrown or else indifferently farmed by Negroes. This particular one had nothing in it but a few old cotton-stalks, the area, some two acres in extent, being surrounded by dense wildwoods.

With the Negro I crawled up to the edge of the thicket, and peered through the rotting fence toward the river. Not more than sixty yards away I saw a wild gobbler standing, a superbly wary creature, there in the full sunlight of noon, all his iridescent plumage shimmering. The perfect picture of alertness, his head held high, all his feathers drawn in trimly, he stood apparently alone.

"I thought you said there were two," I whispered to my guide lying beside me. But my companion had seen truly.

"Cap'n," he answered, "look on the ground."

This I did; and almost under the first bird, that was standing so erect and sentry-like, there was another, literally wallowing in the warm dry sand of the cotton-field. He was wholly relaxed, all fluffed out, and was thoroughly enjoying himself, while over him his old wildwood pal kept watch. After a while, the gobbler on the ground arose, shook himself prodigiously, so that the air surrounding him was filled with dust and tiny feathers, preened himself a little, and then suddenly became alert, as his fellow relaxed and lay down in the dust-bath. They were too smart to wash together; first one took up his post as sentry, then the other.

"ONE WOULD FEED QUIETLY WHILE THE OTHER, HIS HEAD HELD HIGH, HIS BODY MOTIONLESS, WOULD KEEP WATCH AND WARD"

This incident illustrates a principle common in wild life: it is that of posting watchmen. We have our policemen, our soldiers, our highway patrolmen, our guardians of the public safety. In some such way both birds and animals often station their sentries; and this is especially true when some members of a group are feeding or are otherwise off their guard.

I remember one twilight seeing two old stags come out of the darksome cedar and palmetto jungles of Bull's Island, to feed in the open marsh country. But they did not feed together. I mean that they would not put down their heads simultaneously to browse. Standing side by side, one would feed quietly while the other, his head held high, his body motionless, would keep keen watch and ward. When the first stag raised his head, it was the signal for the other to begin to feed. It was perfect teamwork, and an example of perfect alternation. Behind a screen of Spanish moss hanging low on a live-oak, I watched these old stags for nearly an hour; and there really was not a moment during that time when one or the other was not on vigil.

I have seen the same kind of thing many times with small herds of deer, when one would always be the sentinel; but there was something about the alternate lifting and lowering of the great antlers of those two bucks that has always remained memorable to me.

There are not many birds that do not have some regular system of watching and then of signaling when danger is feared. But I think the mockingbird is the only bird I know that, taking up its residence in a tree, will watch for all intruders (including man), and will attempt to drive them fiercely away. With many birds, of course, a like performance takes place during the nesting season; and the kingbird is inclined to be especially touchy about trespassers. Hence had he his Latin name, *Tyrannus tyrannus,* the tyrant of tyrants. Who has not seen him fiercely pursue and put to ignominious rout other birds, however large, that approached his nesting tree? But the mockingbird is inclined to inhabit a certain tree throughout the year. It is his castle, and he guards it well. According to my observation he loves a red cedar, or a tree smothered in some evergreen vine such as smilax or climbing honeysuckle. He is his own sentinel, ever watchful, and not kindly disposed toward visitors. I sometimes think that birds of high artistic temperament such as his are far more sensitive toward intruders than are commoners.

I recall visiting, in Blake's Reserve, a great artificial lake in the Santee country, rookeries of both the great blue heron and the snowy egret—this second bird having come, a few years ago, perilously close to extinction through the depredations of plume-hunters. These colonies were in the tops of tall cypresses growing in the water. I noticed that, while many of the birds were incubating or feeding their young, others kept watch, and set up an alarm while I was still a good way off. I believe that at such a time the males are usually the sentinels, the mothers being busy with household cares.

Few scenes of Nature could be more idyllic than this nesting colony of egrets. The place is one of utter loneliness and beauty, where the wild wistaria climbs the tallest trees, festooning them with falling stalactites of purple blooms; where the yellow jasmine tosses her saffron showers; where the gorgeous wood-duck drifts in iridescent brilliance on the black waters; where, on the surface of those same mystic waters, the alligators swim, as if they were primordial dragons in some medieval tapestry. And then, snowy against the radiant sky, are the egrets, either winging their way gracefully over the great swamp, or settled on their nests, or poised on the tallest branches, keeping watch above this aerial community. From the fragrant woods one hears the clear calling of the cardinal, the love-song of the parula warbler, the rollicking carol of the Carolina wren. Here, too, I have heard the eerie sweet song of the summer tanager—that valiant little knight in dusky red armor, who keeps such faithful vigil over his mate and her nest.

As would be natural, however, it is wild *game* that appears to have established most perfectly the system of sentries. These birds and animals have not only their natural enemies, but man as well; and their being hunted has made them develop an especial kind of protection. They post their guards. I may even say that birds and animals that are not game but are shot at by man will not only become wilder but will be more particular about their wardens.

One day I was crawling down through a ditch that crosses my cornfield in order to shoot into a flock of crows that had been playing havoc in my young corn, pulling up the young stalks in order to get the sprouted kernels. On the top of a dead cherry tree on the ditch-bank there was an old sentinel crow, whose sole business was to keep watch while his fellows ate up my corn at their ease. For some reason he did not see my approach, and I got near enough to the flock to shoot into them and give them a great scare. As they rose, I noticed that they set up an unusual cawing; and as the drowsy sentinel who had betrayed his trust joined them, I saw that they were cawing *at him.* Moreover, they struck at him angrily. They seemed really more interested in punishing him than in escaping from me. As far as I could see them and hear them, until they disappeared over the tall yellow pines, they kept berating their disgraced comrade and beating him. It is not alone in human life that betrayal of a trust is justly regarded as among the worst of crimes.

One day in March I was driving along a Maryland road when my attention was attracted by a flight of wild geese. When I see one of those gray spearheads in the sky, I always get a thrill such as few other sights in Nature afford me. These geese were flying surprisingly low, and the course of their flight was going to take them directly over me. Pulling my car to the side of the road, I stopped to watch them. They had come, I think, from Currituck Sound or the Chesapeake; and they were going to the Great Lakes, perhaps to Saskatchewan; anyway, to the far north; and they knew their route.

A wild goose flying at the apex of this triangle, which is always open at the base, is apparently responsible for the

EACH WILD TURKEY TOOK TURNS AT STANDING GUARD WHILE THE OTHER WALLOWED JOYFULLY IN THE DUST

speed of the flock, for the direction taken, and for the height at which the birds travel. He is also supposed, I take it, not to lead them into danger. As the flock neared the road, a farmer ran out of his house and began shooting at the geese with a rifle. They had passed low over his barnyard. Immediately upon the sound of the rifle, the geese set up a great clamor; and as nearly as I could judge from their tones and from their behavior, this is what they were saying. "Hey, you there in front! Are you asleep? Why did you bring us over that barnyard? Don't you know that we are flying too low? Get out of that and let some one lead who knows how to lead!"

I say they "said" that. I mean that, by interpreting their wild cries and their behavior, I judged they were berating their leader. At any rate, he was immediately displaced by a big old gander that came up from the middle of the line. The disgraced leader fell back, and as he passed each goose, he was shouted at some more, and I distinctly saw them strike at him with their wings. He was driven back to the very end of one of the lines; just punishment for one who goes to sleep on the job.

While the pure scientist hesitates to suggest anything that he cannot prove, and while he is often unwilling to attribute to wild creatures some of the emotions of human beings, I have found, to my own satisfaction at least, that they often display anger, pleasure, resentment, excitement, and other emotions common to us. Man is different, but he is not unique; and we share many traits with our humble cousins of wood and field.

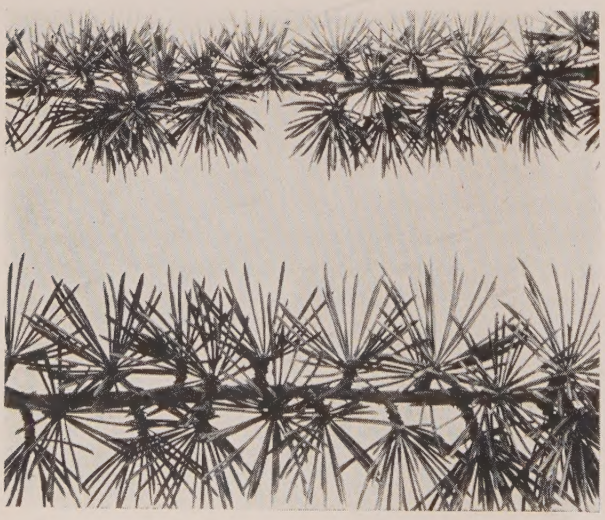
One thing that has interested me about wild sentinels is the attitude taken. I mean that a human sentry often loafs and dawdles, poor man! But a wild deer that has taken up the watch, either for himself or for another or others of his kind, takes on a kind of spectral silence and immobility that, unless he be right in the open, makes him very difficult to see. A wild turkey does the same thing. I have seen both sentinel deer and turkeys stand absolutely statuesque for eight or ten minutes. Motion is what we usually see; and if the wild creature remains still, it often merges with the landscape. I have read that even elephants in brush are hardly discernible when they have adopted a pose of silent intentness. Often I have tried to show friends a wild animal or bird; and unless the thing moved, it was commonly not seen. These wild sentries, therefore, not only watch, but in so doing they do not fidget. While her young were feeding all about her, filling the air with the faint sweet treble of their pipings, I have watched an old wild turkey mother stand for five minutes, looking, listening for possible danger to her babies, but never once moving, knowing that the minute she moved, any foe would at once detect her presence.

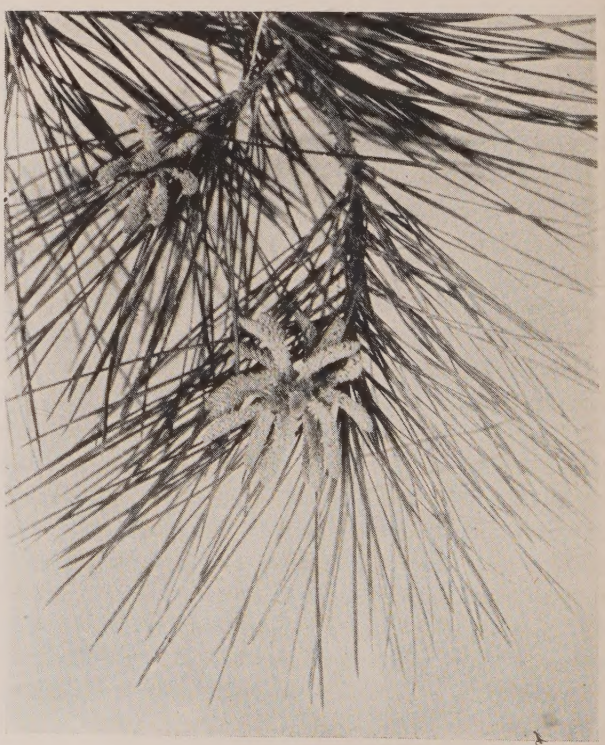
A stretch of marshland is a good place to watch these warders of the wild. There is that male bobolink, swaying on a cat-tail, apparently carefree and debonair. But step a little closer, and he will warn his mate. There is that redwinged blackbird, from the top of an elder bubbling his liquid glee. But if he becomes suspicious, his note at once changes. Practically everything has its note of alarm; not only its own cry of personal alarm, but its warning note to others. If a cat walks through the pinewoods by my house, the bird songs will cease; and in their stead will be these watchwords of warning. Often one can detect the presence of a predator by listening to the voices of the birds.

Wild sentinels: faithful are they, wonderfully keen and discerning. And if by some negligence they appear disloyal, they are punished, not only in a physical way as they sometimes are, but by that far more effective method of being made to feel unworthy of the confidence of their fellows.

FIVE OF OUR NEEDLED EVERGREENS, EACH ONE SO INDIVIDUALISTIC AND INTERESTING THAT WE SHOULD ALL BE ABLE QUICKLY TO RECOGNIZE THEM

At the upper left we see the somber plume of the English yew, *Taxus baccata,* the little, light-colored globes being the berry-like cones. At the upper right is a branch of the red spruce, *Picea rubens,* a common species of our Appalachian Mountains. Directly below is one of the western pines, the Monterey pine, *Pinus radiata,* restricted to the California coast. The leaf bundles are mostly in threes and this branch bears staminate or pollen-bearing strobili. At the left are some slender twigs of the eastern hemlock, *Tsuga canadensis,* with its interesting tiny cones. In the lower left hand corner are twigs showing the stubby short-shoots of the true cedars. The twig above is of the Atlas cedar, *Cedrus atlantica;* below, the deodar cedar, *Cedrus deodara*





Know the Evergreens

To many people all of these trees are pines, but knowing one from the other is worthwhile

By E. E. STANFORD

FEW tree-groups are better known—as groups—than the needled evergreens. As to knowing the differences between the kinds—between the pines, the spruces, the firs, and the rest—the "man in the street," or in the park or forest, or even the man who lives beneath one, is often less sure of his ground. Or, perhaps, we had better say of his foliage. Not long ago I stopped for the night at a pleasant tourist lodge called "The Pines." The fact that the only evergreens about the place were some fine old Norway spruces probably worried nobody save an occasional botanist like myself, who might have found "The Spruce Place" a more fitting name as well as more novel than "The Pines."

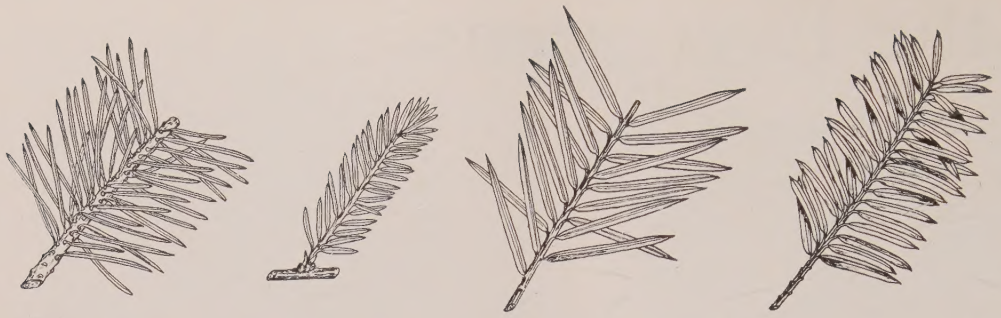
It is not so hard to distinguish a pine from a spruce, or from a fir; or even a spruce from a fir or hemlock. When it comes to picking out particular kinds of pines, spruces, or firs, the fun begins. But let's not attempt much of that just now, but stick to those "bunches-of-kinds" technically called genera.

In most localities there are plenty of specimens to practise on. The needled evergreens are old trees. Their lineage goes far back of the oaks, the beeches, the maples, and the rest of the broad-leaved upstarts. So the narrow-leaved kin have had plenty of time to get themselves scattered about the world. In many places, of course, they have disappeared, crowded out of warmer climates and better soils by those more versatile later relatives. But they stick tenaciously on sand barrens, mountain slopes and alpine heights, and range far into the chilly lands of the north. There they still thrive, thanks to a certain dogged ability inherent in the nature and structure of those tough, narrow leaves themselves. Those leaves somehow build food in cold climates; in regions where water is scarce; in temperatures around the freezing-point; under general conditions that make the broad-leaves give up in despair. Those leaves are tiny as individuals; but try to estimate the total sun-exposed, life-manufacturing surface area of the millions and millions of leaves on a huge old pine or redwood! Such leaves can build a tremendous amount of wood-forming substance in a year. And when they once get started, other tree-kinds have little chance to live and prosper in the thick dense shade of their canopy. So the needle-leaves are widely scattered. Except in the Ohio Valley and the southeastern central United States, they made the original forest, and they are still our chief sources of lumber-supply. Even where these trees have been stripped away, or where they did not naturally occur, they have been brought back or introduced by home owners and landscape architects. So if you would learn to identify the needle-leaves you are not likely to lack material for practise. Identification can be made most quickly by the cones, if you can find the cones. But on young trees, and on older ones at some seasons, there are likely to be no cones, or none within reach. So for the sake of all-time use it is best to know the leaves.

COLORADO SPRUCE AND NORDMANN FIR

At the left is a twig of the beautiful Colorado blue spruce, *Picea pungens*, and next to it the brush of blunt needles of *Abies nordmanniana*, sometimes cultivated in America

To many people, as probably to mine host of the spruce-refuge, all evergreens, needle-leaved or not, are pines. The true pines, of the genus *Pinus*, do constitute the largest and most widely spread evergreen-group. There are seventy or more species and innumerable varieties. Of all the needle-leaves, *Pinus* is perhaps the easiest to identify. The leaves are characteristically long and slender, most needle-like. Save on seedlings, these needles grow in little groups, or bundles, on tiny short-shoots. The bases of these bundles are wrapped in scales—leaves of a sort themselves—which fall from some kinds as the bundles mature. The needles in the bundles are of quite definite number for any given species. Five is the highest number in a bundle, and that is characteristic of the principal members of the soft or white pine group,



Douglas Fir Bald Cypress California Nutmeg Yew

DRAWINGS OF TEN OF OUR NEEDLED EVERGREENS MADE BY E. L. SPULLER. THE DRAWINGS ARE REPRODUCED ABOUT ONE-HALF THE NATURAL SIZE OF THE MATURE TWIGS

including the eastern white pine, the silver pine of the far West, and the Sierran sugar pine. These five-leaved pines are the kinds that have been causing our foresters so much worry. They are susceptible to the European blister rust that jumps from currant or gooseberry bushes to white pine and back again in a peculiar and most disastrous manner. Eradication of blister rust has been among the principal employments of relief workers in the forests in these last few years.

More numerous than the white pines are the two-leaved and three-leaved members of the yellow pine or pitch pine group, such as the long-leaf pine of the turpentine belt, the western yellow pine of the Rockies and the Sierra, the lodge-pole pine of the Yellowstone region, and many more. Some of the pitch pines of the southern Atlantic region grow so rapidly that they may supply the cheap cellulose of the future, and supplant the spruce in the pulp and rayon industries. The tough brown paper bag used by the grocery store was made of pitch pine almost as surely as your morning paper was made of spruce.

Likewise long-needled, but with needles in greater indefinite number on larger stubby short-shoots, are the larches of the genus *Larix,* and the true cedars, or *Cedrus*. Larches are soft-leaved, rather pallid of color. They are not, strictly speaking, evergreens, as they shed leaves in the winter. Their alliance, however, is with the conifers. There are two kinds of larches in the forests of Canada and the northern United States, but if you find one in cultivation it is quite likely to be the European larch. If the leaves turn bright yellow before falling, call it a Chinese golden larch, which botanists place in still another genus, *Pseudolarix.*

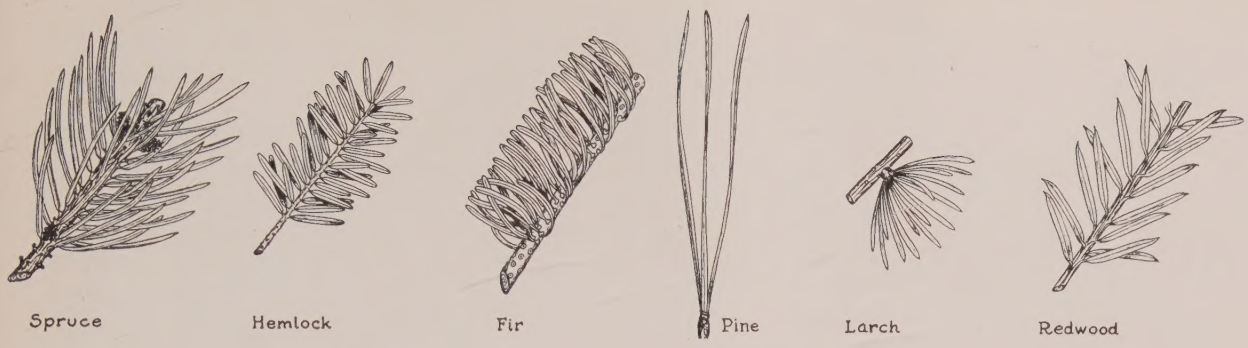
YOUNG SEEDLINGS OF THE PINE

These generally bear needles singly at first, and essay the longer and bundled foliage as they grow older. This is a twig of *Pinus pinaster*

The stiff-leaved and evergreen true cedars are not native within our boundaries, but the deodar cedar of India is perhaps the most popular cultivated evergreen in California, where it is largely planted as an "outdoor Christmas tree." It is occasionally seen in the South. Two other kinds, Atlas cedar and cedar of Lebanon, are also sometimes planted. The latter will grow as far north as New York. Leaves on the young slender shoots of larches and cedars, like those on the seedlings of pines, often go back to what is doubtless an ancient ancestral character of conifers, and come out singly.

When we come to single-leaved and shorter-needled kinds, it is rarely difficult to identify a spruce, *Picea.* Spruce leaves are sure-enough needles; spiky, sharp, generally four-sided, and likely to be thrust out stiffly in all directions from the twig. They grow from stubby bases, which remain on the branchlets after the needles have fallen; the stubby-stiff twigs are then rougher than rat-tailed files. Spruces are northward rangers, not too fond of cultivation, and apt to become somewhat unsightly and unsymmetrical with age. If you can prick your fingers on your Christmas tree, it is almost certainly a spruce.

More slender of twig, and with less conspicuous bases from which short and generally flattened leaves spread in flattened fronds, are the graceful hemlocks, *Tsuga,* also known as hemlock-spruces —a name that probably should be forgotten. Short blunt hemlock leaves fall indignantly almost as soon as the branches are brought indoors. Somewhat out of the usual hemlock character is the mountain hemlock of high altitudes and the Sierra, the crowning hemlock of Crater Lake.



John Muir called this the most beautiful conifer in America. On the higher mountains it becomes a scrubby shrub of the timber line. Its leaves are spirally arranged rather than flat-ranked, and themselves are generally convex rather than flattened.

True firs, *Abies,* even more than the spruces are lovers of alps and cold northern soil. Or, perhaps, they grow in such regions because they can "stand it" better than other trees that outgrow them under better conditions. Fir leaves are borne all round the branchlets, but are likely to curve upward into a sort of crumb-brush formation, or to spread, like those of the hemlocks, in flattened fronds. Sometimes there is a good deal of diversity of leaf-bearing habit on a single tree. Leaves rise directly above the bark, without stemlets, and hang on tenaciously; they leave circular spots of protest when they fall. They are soft and flexible rather than stiff, and likely to be blunt or minutely notched at the ends. The Spanish fir, sometimes cultivated in the warmer States, has stiffly outthrust and rather sharp leaves —a habit somewhat like a spruce—but it lacks the spruce peg-bases.

EASTERN WHITE PINE, *PINUS STROBUS*
Here we see the characteristic thick foliage-brush and the pitchy cone of our favorite

Not too readily distinguished from the firs, or, at a distance, from a spruce or hemlock, is that mighty timber-conifer of the Pacific northwest, the Douglas fir, *Pseudotsuga.* The leaves, like those of the firs, are stemless; they are more slender and even more flexible. Perhaps the best sign of the Douglas fir in its winter condition is the trim reddish and pointed buds that are generally more conspicuous on the branch-tips than the duller rounded ones of the firs or the ragged ones of the spruces. The Douglas fir is the chief Christmas tree of the Pacific Coast, and the Yuletide season of 1936 will long be ruefully remembered in that region because the shipping strike interfered so much with fir-shipment from the northwestern forests.

Other needle-leaves are rare, scattered, and often local; we shall have to hurry through them. They are, moreover, not so closely related to the pines and the spruces. The redwoods, *Sequoia,* of the Pacific Coast and the bald cypresses of the South are allied; remnants, now, of a former wide distribution. The sharp, pale, yellow-green needles of redwood run down on the branchlets and merge with the bark. The larger redwood-relative, the big tree of the Sierras, has short awl-spurs rather than needles.

Bald cypresses, *Taxodium,* like the larches, shed leaves in the fall; in fact, they are likely to shed branchlets and all. In summer, bald cypress foliage is light green and pleasantly feathery, rarely seen save in the swamps of the South and occasionally in cultivation, as in Gettysburg Cemetery.

Still more remote from the pine-kind are the yews, *Taxus,* and their relatives. Yew leaves run down into the bark somewhat like those of redwood; they are dark green above and generally yellowish beneath. The bright soft reddish fruit distinguishes them sharply from other conifers. American yews are rather scrubby and not often cultivated; the Oregon yew sometimes gets large enough to be used, like its English relative, for bow-making. If you see a yew in cultivation, as you often may, it is probably the slow-growing, solemn-looking, but eventually stately English kind. Yew leaves are soft, while those of the rare California nutmeg, *Torreya californica,* are long, stiff, and atrociously pointed.

Junipers, *Juniperus,* of some kinds have short needles; one might better term them awl-leaves. Most of them have tiny scale-leaves as their foliage. The scrubby junipers of the East and alpine heights farther west are more needle-leaved, with pungent foliage jointed at the leaf-bases.

Here, then, we have a general picture of the needle-leaved evergreens. As a group they have beauty and importance. As species they are interesting if one will only make their acquaintance.

HEAD-HUNTING

By STEPHEN HAWEIS

Illustrated by Russell O. Berg

THE head-hunting instinct and custom is evidence of the lowest grade of civilization. It is widespread and we find it prevalent among the Dyaks of Borneo and in the remotest backwoods of South America. It is not unknown in North America, although the practice of scalping is more usually connected with the northern tribes. The scalp, of course, was merely the hair upon a circle of skin neatly lifted from the skull with a knife, and dried. Scalps were worn as objects of decoration, or as part of a costume, and were not used to take the place of other prematurely fallen hair. Human hair worn in this manner is not called a scalp but a toupee, and many of them are triumphs of hairdressery. Their use is not related to the head-hunting instinct at all, and they need not be discussed further.

The complete heads, so highly valued by savages, are the cause of many murders, for these degraded people make no use of the bodies, so that even the cannibal may be considered a cut above them in the scale of Nature. Very often it is not a dangerous enemy who is attacked; it may be anybody who can be surprised without too great danger of immediate retaliation. The head is wanted solely as a trophy, the evidence of skill, courage and prowess that touches the hearts of maidens, even when none of those qualities were requisitioned in the obtaining of the trophy. One can compare the custom with the senseless theft of road signs, hotel towels and policemen's batons. Trophy collecting and head-hunting are closely allied.

The exposition of heads upon spikes was a well known custom of our ancestors. That was, however, only done with the heads of enemies, as an act of triumph or merely as proof that the enemy was dead. As such they were excellent proof. White men never went to the extreme of preserving heads as primitive man does. For many years ethnologists were curious to know exactly how, without preservatives and disinfectants, savages learned to remove the brains, crush the bones and produce a recognizable human head no larger than an apple. Civilized people have denied themselves the pleasure of making these heads, but are often willing to give a high price for a good specimen. Certain tribes, or, more properly, types of men, have the desire in such a marked degree to possess heads that they will go to great trouble and expense to obtain even the heads of animals that have never done them any injury. They do not eat the bodies of the animals they kill, and this fact obviously allies them with the true head-hunter. They use the heads, as primitive man has always done, to hang upon the walls of their huts. These curious people, when unable to afford the costly process of curing or stuffing the heads, are frequently quite satisfied to obtain other parts of animals that can be kept. Though ugly and useless they are eagerly sought for and much prized. Very often they are used as proof of stories which originated solely in the primitive imagination of their owners.

One would imagine that in any tribe individuals who developed such abnormal tastes would be regarded with disfavor. By a few they are so regarded, but others, through long habit and want of thought, do not discriminate against them, permitting them to frequent their families and even to marry their daughters as though they were their equals. These folk are indeed not always savage in other ways, and are more often white men than black, or other color. They may be found in great numbers in the United States, in the most cultivated environment, although themselves belonging to the Stone Age.

"No, Madam, I prefer not to give any precise instances, nor mention any names. No, not even one—it might be that of your father or brother."

THE BLACK WITCH IS A MOTH COMMUTER FROM CENTRAL AMERICA

At the left is the male, whose wings are often wholly black on the upper surface. The female at the right may always be distinguished by the band across the middle of her wings

The Black Witch

This gorgeous multi-hued King of the Tropics wings its way across the waters of the Caribbean

By FLORENCE MOORE GRIMSHAWE

BLACK WITCH is a name that is "spooky" and suggests supernatural power. Yet it is well applied to a moth able to wing its way surely from its native South and Central America and the West Indies across the great expanse of emerald water to new haunts in south Florida, seemingly retracing Columbus' famous voyage in search of new sweets just beyond.

The most magnificent as well as one of the largest of our Noctuids, *Erebus odora* is the only one of the genus known to occur in the United States. Once regarded only as a visitor, it is now found breeding in the vicinity of Miami, Florida. As a straggler, it was long ago found in Canada, and one was taken at a high altitude in the Rocky Mountains. Strong of wing and swift of flight, it is not surprising that it should stray far away from its tropical home.

The black witch has a wing expanse of five inches or more; its only rival in powers of flight seems to be the giant sphinx, *Cocytius antaeus,* likewise a Central American. Readily attracted to many kinds of bait, *Erebus* is particularly fond of a mixture of cooked evaporated apples, brown sugar, a little stale beer and a few drops of Jamaica rum. Over-ripe bananas it also considers a delicacy.

It is not unusual to see a male guarding his sweets after he has sipped until he is too dizzy to fly away. He will prevent others from joining him by swift strokes of his powerful wings. On a few occasions I have seen three or four of these beauties feasting at the same time, usually all of the same sex. The wings are beautifully mottled with various shades of brown, with lines of lighter marking on their borders. Near the base of each fore-wing is a reniform eye-spot bearing a blue crescent, and on each hind wing are two discal spots with white borders. Melanistic males with the upper surfaces of the wings almost wholly black are not infrequent. The lady witches may always be distinguished by the white median bands and less-pointed apexes of the wings.

A sight of these magnificent moths hovering around a banquet spread for them on the trunks of the monstrous live oak trees is unforgettable. The trees are laden with the various arboreal orchids, and the long festoons of Spanish moss add to the beauty and spirit of the forest and jungle.

In the garden, one glorious, tropical moonlight night, I saw what seemed to be the love dance of these beauties of the air. A dozen or more would soar in dancing flight high up above the tree tops, then drop close to the earth. In imagination one could sense soft music in the air; were the black witches making some strange music with their wings—love notes?

A few years ago this moth was considered rare, but each year it is becoming more numerous. Wishing to rear some, I found it easy to obtain the eggs. To find the proper food plant was a problem. In fact, I found that the food plant was unknown to entomologists. Learning, also, that the life history of this species was not known, I set about to experiment. First the tender leaves from various exotic plants, shrubs and trees imported from the West Indies, were tried. After many failures, I found that the golden shower, *Cassia fistula,* and *Pithecolobium guadalupense* proved to be the favorite host plants.

One female black witch captured on May seven was placed in a large brown paper bag with a few holes for ventilation. With this as a home, the lady went to work.

On the days she was fed and given a new home she would lay as many as one hundred and eighty-three eggs. If neglected for a day she laid only three or four. As

food I dissolved a little brown sugar in a spoon, carefully holding it inside the paper home. When I placed the spoon near my captive's head, she soon smelled the sweet mixture and thrust out her long tongue and drank. After she had taken a few feedings, I coaxed her to sit on my finger and feed from the palm of my hand. Laying continued sixteen days, and eleven hundred and eighteen eggs were deposited. Each day the eggs were gathered, counted, and placed in a small glass container with a label giving the date and number of eggs. On the seventeenth day, after fulfilling her mission as an insect mother, the moth passed away without fuss or flutter.

Knowing the food plant and habits of the black witch, I began searching the open forest and groves for the larvae. It was a thrill when I came upon a magnificent tree of the golden shower, the dense green foliage riddled by a band of black witch larvae. The caterpillars of this moth crawl to or near the ground during the day to hide away from hungry birds.

Taking a few caterpillars, I reared them in a separate cage to compare them with those I was raising from eggs. The only difference seemed to be in the larger size of those from the wild, which were able to select their food at times and in quantities as Nature intended. This rule holds good in rearing practically all insects.

FOUR STAGES OF THE BLACK WITCH
The eggs, larva, pupa and adult of this fascinating insect, now a resident of Florida

Eggs of the black witch are spherical in shape, no larger than the head of the smallest pin. They are chocolate-brown, and are deposited singly on the under surface of leaves, or occasionally on the tree-trunks, usually only a few feet from the ground.

The larvae emerge from the eggs in four days if the temperature averages 84° F. They are loopers, and during the first day they do not eat, but race around their prison walls like little wild animals in a cage. If given a sudden fright or jolt, they will immediately drop, spinning a thread of silk. Some of them suspend themselves in mid-air, later to return to their resting place; others are not contented until they reach the floor of the cage and find seclusion.

Hatching early in the morning, they take their first food in the evening at twilight, or on cloudy days, during the day. They retreat to a protected spot during the day, to reappear at nightfall.

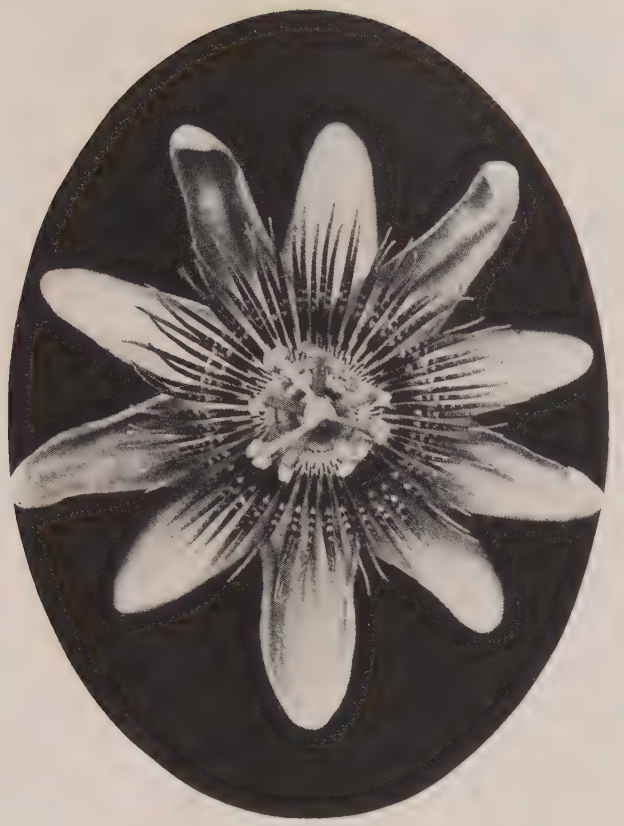
The caterpillars go through three distinctive molting periods. At eight days they become restless and leave the food plant in search of a place where they will not be disturbed, remaining dormant in this location for eight or ten hours. Here they will be observed fastening their anal prolegs to some object with a thread of silk. When this is done the insect rubs its head from side to side, breaking the head sheath loose, thus taking the first step in throwing off the old coat for a new one. The caterpillar then works itself forward out of its skin, this requiring twenty minutes or more. The larvae remains motionless for a short time, allowing its new uniform to harden, and then eats its old coat. It is now ready to return to the food plant. This process is repeated at intervals of eight days until full development is attained.

The color of the body in the earlier instars is a satiny brown, which develops into grayish-brown as maturity nears. On the middle of the back there are three prominent whitish spots, and some microscopic ones.

The molting period is a delicate stage in the life of a caterpillar. About fifty per cent of my losses occurred at this time. At the age of thirty days the insect begins the transformation known as pupation, in which process life passes into a condition in which almost all power and motion are lost.

This cycle of its life is passed on the surface of the earth under leaves or fallen branches. A flimsy cocoon is formed by casting silken threads loosely around the fallen leaves, in order to hold firmly the material within which transformation takes place. The average period passed in the pupa state is thirteen days, a short time in comparison with some of our northern Noctuids that do not emerge for six and eight months.

Without exception the emergence occurs between eight and nine in the evening, preferably when it is warm and damp. The encasement breaks around the wing sheaths and down the back, and within an hour strange looking creatures with large bodies, small soft wings and big ruby eyes will race from beneath the dead dry leaves that have accumulated on the floor of the breeding cage. The first act of the insect is to secure a quiet resting place; then, after remaining still for a few seconds, it begins a sort of vibration, caused by the fluids in the thorax being forced into the wings by the action of the heart. This causes them to expand and grow strong and beautiful, and the perfect insect is then able to fly away into the romance of its adult existence.



THE BLOOM OF THE PASSION FLOWER, MOST FREQUENTLY POINTED TO AS REPRESENTING THE CRUCIFIXION OF CHRIST

FIVE SEPALS, TOGETHER WITH FIVE PETALS, STOOD FOR TEN APOSTLES, IGNORING PETER, THE DENIER, AND JUDAS, THE BETRAYER

Flowers of the Passion

"And the soldiers plaited a crown of thorns, and put it on his head . . ." St. John 19:2

By HENRICKS HODGE

A CROWN of seventy-two thorns! To torment Jesus his fellow men even demanded that Nature take part by providing such a cruel coronet. Ever since that time men have wondered just what plant species was the source of the original crown. Thorns are ever-present in this wide world of ours, and wherever there has been found a particularly formidable-looking one the plant bearing it has been often christened crown-of-thorns plant. Such name has been given to a thorny plant of Madagascar, *Euphorbia splendens,* now often grown in dish gardens.

The Euphorbiaceae, the family to which this species belongs, was named—thanks to the medicinal properties of certain species—after an old Greek physician, Euphorbus. Our commercial source of castor oil, the seed of the castor bean plant, *Ricinus communis,* is a good example of this important group. This family has many black sheep in whose veins run in milky form some of the most toxic poisons known. The very potency of castor oil results from the minute quantity of the poison, ricinin, that remains in the oil after it has been expressed. Indeed castor beans themselves, when eaten, have caused the death of children.

In the tropics, members of this family have been killing men for centuries, their potent juices being smeared on aboriginal arrows. It is even a native superstition that if a warrior falls asleep beneath one of these poison trees, *Hippomane mancinella,* his sleep will turn into that of the dead. In India, the West Indies, and neighboring countries, another member annually causes cases of blindness to woodcutters who get its juice in their eyes while chopping. Here the culprit is the famous sandbox tree, *Hura crepitans.* It seems logical then for "birds of a feather to flock together", and that *Euphorbia splendens* should have been used by willful men to crown the Savior with thorns.

Many species of this genus are characteristic of waste places, as though outcasts or tramps, unrecognized by fellow plants. In such localities, particularly in Africa, species of the family become the dominant desert flora and are as well known and grotesquely ornamental in those areas as are the cactuses in our own western wastelands. The crown-of-thorns plant belongs to this group of desert dwellers. Its spine-covered body is typical of such vegetation on the island of Madagascar. It has few leaves, and then only on the new growth, and thus conserves its milky life blood by not too rapid moisture evaporation. Its main stems scramble over the ground,

THE FIVE-LOBED LEAVES OF ANOTHER SPECIES OF PASSION FLOWER REPRESENT THE HANDS OF THE ACCUSERS WHO HELD WHIPS, THE COILED TENDRILS

rearing themselves to burst into glowing desert bloom.

Here and there amongst spiny stems seeming flowers are found, all borne terminally on short stalks that arise from a sturdy stem common to each. What first appear like two large salmon-pink petals resolve themselves into large attractive bracts—nothing more than leaves colored to attract insect visitors. In this bract-bearing habit it resembles its cousin, our well-known poinsettia. Feel the stalk that supports the flower cluster. It is as sticky as flypaper and just as efficient. No creeping insect will ever filch the nectar of this plant. Thus, to insure cross-pollination, only winged insects are eligible. Along with the nectar, they will carry pollen from one plant's flowers to those of another. Nothing is wasted in the desert—not even nectar! Bend back the two bracts and in the center is a tiny flower, trying, in shame it seems, to hide its part taken in the crucifixion. Here is a flower that is a true crown amongst thorns!

Unashamed is another flower of the Passion, and rightly so, for in other than name it played no personal part in the Passion. The botanical name, *Passiflora,* literally means passion flower. If the crown-of-thorns plant is to be linked with the earthly crucifixion, the beauty of this true Passion flower is deserving of its association with the transfiguration. So must the priests who first discovered this tropical climber have been impressed, for to them it was a flower so "stupendously marvelous" that they hardly dared even to write concerning it.

Members of a family of woody vines, climbing by means of long tendrils, the various species of *Passiflora* are distributed in the tropical and sub-tropical districts of both hemispheres. The chief center of abundance is western tropical South America. The much-cultivated climbing species bear large-lobed leaves that carry leafy stipules at their base. The flowers themselves are either borne singly along the climbing stem, or in a cluster terminally, as in red-flowered *Passiflora racemosa.*

To understand the reason of the name Passion flower, let us look at the floral structure. Most showy of the genus are the varieties of *Passiflora caerulea,* one of which, *P. alato-caerulea,* is pictured. As with most of the large-flowered species this one has a shallow saucer-like flower; its outer floral members, consisting of five sepals, are flushed a beautiful pink. At the base of these members is located the most conspicuous and beautiful portion of the individual flower, the coronet or corona. This consists of tubular outgrowths, useful, perhaps, in favoring cross-fertilization by insects. Upraised in the central part of the flower stands a cylindrical stalk that bears above its middle a ring of five stamens. Above this ring, and constituting a prolongation of the same stalk, is the slightly swollen ovary, itself terminated by three reflexed knobs that are the styles with the pollen-receptive stigmas.

The name Passion flower arose from the resemblance of these floral parts to important implements of Christ's crucifixion, the resemblance being first pointed out by early Italian and Spanish travellers. Some of the early religious men saw in the corona the crown of thorns, others thought it the halo; to some of them the five stamens were the five wounds, to others they represented the hammers used to drive the nails, represented by the three-knobbed styles. Five sepals, together with five petals, stood for the ten apostles—Peter, who denied, and Judas, who betrayed, were left out of the reckoning. The innumerable mitten-like leaves of some species are the pointing hands of the accusers, who held cords or whips, the tendrils.

Legend and superstition have long been associated

THE CROWN-OF-THORNS PLANT, NATIVE OF MADAGASCAR AND THOUGHT TO BE THE SOURCE OF THE THORN-CROWN OF GETHSEMANE, BEARS FEW LEAVES AND TINY FLOWERS

with these beautiful blooms. In *Plant Lore, Legends and Lyrics,* Folkard states that when the Spaniards first saw the rich festoons of this plant hanging from the branches of the forest trees they "regarded the magnificent blossom as a token that the Indians should be converted to Christianity, as they saw in its several parts the emblems of the Passion of our Lord. In the year 1610, Jacomo Bosio, the author of an exhaustive treatise on the Cross of Calvary, conceived it to be his duty to present the Flos Passionis to the world as the most wondrous example of the Croce trionfante discovered in forest or field. The flower represents, he tells us, not so directly the Cross of our Lord, as the past mysteries of the Passion. It is a native of the Indies, of Peru, and of New Spain, where the Spaniards call it 'the Flower of the Five Wounds', and it had clearly been designed by the great Creator that it might, in due time, assist in the conversion of the heathen among whom it grows."

If the delicate beauty of the flower had not been a source of satisfaction to man its fruit would certainly have been, for certain species supply succulent, berry-like fruits. In some cases these are highly perfumed and appear often on tables in the tropics. *Passiflora quadrangularis,* a common garden plant in the tropics, is the granadilla of the West Indies; *P. laurifolia* is the water-lemon of the British West Indies and the *pomme-liane* of the French colonies; *P. maliformis* is known in the West Indies as sweet calabash. None of these vines are grown in such great numbers as are the plants of *Passiflora edulis,* a native of Brazil, and the passion-fruit of the Australians. Considerably smaller than the seven- or eight-pound granadilla, the passion-fruit—dull purple when ripe—is rarely larger than a hen's egg. In New South Wales and Queensland the fruit is highly esteemed and is grown commercially for use in flavoring sherbets, confectionery, jams and for other table purposes. Recently we have been introduced to a refreshing drink made from the juice of the passion-fruit. The original drink is prepared by beating up the edible pulp in a glass of ice water and by adding a pinch of bicarbonate of soda.

In such gastronomic form the passion flower is appealing to new thousands in this modern world and will continue to do so in the years to come.

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LATE NOVEMBER

By MILDRED H. SISSON

Beneath the ice the brooks
Full merry run;
And though the earth is shorn
It blooms with sun.
The silver milkweed binds
The tattered year,
And on the barren bough
One bird calls clear.

THE LAST CHICKEN HUNT

An historic record in the passing of a splendid bird

By WALTER M. ROSENE

Illustrated by R. Bruce Horsfall

THE BIRD OF THE UPLAND PRAIRIE THAT FILLED THE LARDER OF MANY A HUNGRY PIONEER FAMILY WAS THE PRAIRIE CHICKEN

THE FIRST settlers to cross the Mississippi and come into Iowa found the flora and fauna of the great prairies so rich and abundant that they thought that there would be no end of this great storehouse. Dotting the landscape were thousands of sloughs, marshes and "pot holes." Here in the dense growth of cat-tails, bulrushes and blue-flag were the ducks, and other dwellers of the marsh, filling the air with their lively chatter. The music that can come from an Iowa marsh was known only to those sturdy pioneers. Vast acres of blazing-star, prairie clover and purple cone flowers nodded gaily in the breeze. On the uplands the long prairie grasses bowed before the wind and waved like billows on a vast ocean. "Prairie pigeons," golden plovers, were plentiful, and wafted on the summer breeze came the sweet soft call of the upland plover and the louder call of the long-billed curlew. There was life everywhere.

The bird of the upland prairie that filled the larder of many a hungry pioneer family was the prairie chicken. They were here in countless thousands. Their weird "booming" indicated that spring had come, and with it the mating time for the chickens. The males would then select an open spot on the prairie where they would go through their strutting and courtship antics while the coy females looked on from the nearby bunches of prairie grass. This booming, like the tolling of a deep-toned bell, resounded over the prairies everywhere.

With the coming of the railroad in Iowa, telegraph wires were strung like a web across the state, and many chickens were killed by flying against this new and strange obstruction. The section men working on the railroad could always find a plentiful supply of fresh meat by picking up the chickens along the tracks under the wires.

My father, being one of the early pioneers of Boone County, in central Iowa, used to enjoy telling me of the incidents that occurred then, and one of these stories concerned the last organized prairie chicken hunt in our county. My old friend W. H. Crooks of Boone, Iowa, is now the only survivor who took part in that great hunt, and recently I stood at his bedside in the Boone Hospital and listened to the same story that my father used to tell me. Far too many of the stories of those days have been lost and forgotten, but this one should live, for it deals with the prairie chicken, the greatest of all upland game birds. It also portrays what Iowa was, and what Iowa is today.

In those early pioneer days, there was a great deal of rivalry in every community as to who was the best marksman and the best hunter. Every man and boy aspired to be the best shot in the county, and they had plenty of practice as there was an abundance of all kinds of game. It was a custom each fall to have an organized chicken hunt. The two best hunters would "choose up sides" and the losing side would have to give a banquet at the leading hotel for the winners. This was a great event of the year and one always anticipated with much enthusiasm.

Boonesboro was then the county seat. The small village of Montana, near by, was later destined to become Boone and the present county seat. My father worked in a harness shop in Boonesboro from 1870 to 1874. When he later told me these fascinating stories during my boyhood days in Ogden, Iowa, he did not tell me the exact date of the last hunt but said that it was sometime during those four years. I asked Mr. Crooks at the hospital and he said, "The date on the gravestone of Gene Soule out in the cemetery will settle that." I drove to the cemetery, and after searching for some time finally found an old, weather-beaten marker on which the dates were barely legible. Dimly I read—"Born June 2 1849—Died Aug 15 1872."

This twenty-three-year-old Eugene Soule, commonly called "Gene," was the local gunsmith in Boonesboro, and was also considered one of the best shots in the county. He was accordingly chosen as captain of one side. Each side had an equal number of hunters and the hunt was to last three days. They assembled near the old court house and scores of people were out to see them start and to

wish them success. Father watched them from the front door of the Goetzman harness shop as they started, four or five loads in each party. They used spring wagons, three-seated buggies and single buggies.

Mr. Crooks, being then but twelve years of age, was too young to be a member of the hunting party, but by consistent begging he was finally allowed to go as the driver of one of the rigs. Young "Willie" Crooks was much elated, for his father was one of the hunters and he wanted to "go with Dad" to see him shoot chickens. Their party drove southwest of Boonesboro, across the Des Moines River to Marcy and the surrounding townships just south of what is now Ogden. The other party went northwest from Boonesboro, also crossing the Des Moines River, and hunted up in the northwest part of the county.

FOR THREE DAYS THE HUNT CONTINUED. THERE SEEMED TO BE NO END OF CHICKENS. TODAY THERE IS NOT A NESTING PAIR IN THAT SECTION

It was a happy, jovial group of hunters and dogs that started on that morning of August 13, 1872, each bent on killing the greater number of chickens. If there happened to be a farm house on a section they would go in at that corner of the farm and would hunt right through that section. "Willie" Crooks would then drive the team around the section and meet the hunters after they had crossed the farm. The whirr of wings and the rapid shots were music to the ears of the men and boys. The dogs were all trained retrievers and few birds were lost. At night they would stay either at some farm house, or sleep in the hay loft of a barn.

For three days the hunt continued. There seemed to be no end of chickens. Gene Soule had a "brown hunting dog" that was a good one, and Gene, being a good shot, got plenty of birds.

Late in the afternoon of the third day the parties began to return to the old Occidental Hotel in Boonesboro where the banquet was to be held. One by one the wagons filled with men and dogs and chickens arrived. The chickens were counted and a careful record was kept of them all. The last load to arrive was the one containing Gene Soule and his "brown hunting dog." The awaiting crowd was tense with excitement for the kill of Gene Soule and his party decided the winners. With loaded gun in hand, he sprang from the light wagon, and placing his firearm against the wheel, he called to the nearest group asking how many chickens they had shot. After hearing their reply he loudly shouted. "That's nothing. I shot fifty-five myself."

As he did so, he slapped his hand on his thigh with a resounding smack. His dog, still in the wagon, thinking that he was being called, leaped toward his master and landed on the loaded gun against the side of the wheel. The gun was discharged into the side of Gene's face and he fell, a victim of the two things that he loved the best—his own gun and his "brown hunting dog." He was carried to the Occidental Hotel where he died. Suffice it to say there was no banquet there that night.

My father, standing across the street in the doorway of the harness shop, was a witness of the scene, as was also Willie Crooks. A total of about fifteen-hundred chickens were shot by both parties in this three-day hunt, and these were now given away to the citizens of Boonesboro. The men dispersed and there never was another organized chicken hunt in Boone County. In fact even single individual hunters were scarce for some time after this tragic hunt.

During the sixty-five years that have passed since that day, great changes have taken place in central Iowa. The prairies of waving tall grass have been broken and now one sees little but endless miles of waving cornfields. With the passing of the prairie grass we have also witnessed the passing of the prairie chicken. No more do we hear the booming in the springtime or the whirr of wings in the autumn. The passing of this great upland bird from Iowa has been a tragedy. Where once fifteen hundred could be killed in a single hunt, now not a single nesting pair can be found.

As I knelt in the deep snow of the cemetery, trying to read the inscription on the gravestone of Gene Soule, I wondered whether some day there might not be others kneeling before a monument somewhere, reading the date of the death of the last prairie chicken. I am afraid that that date is not far off.

Benediction

By GRACE MAY STUTSMAN

Softly, quietly,
The Yuletide snow falls in crystal flakes;
Naked little shrubs clutch to their hearts
Thin shreds of winter's beauteous cloak.
The brook pauses,
Then draws a long glistening robe
Snugly to its throat.
A trail of tiny footprints, dimly outlined,
Beckons down a purple-shadowed glen
And zigzags into silence.
Softly, peacefully,
A Yuletide benediction falls in crystal flakes.

PINE OWL

By E. E. STANFORD

"A wise old owl sat in an oak
The more he saw, the less he spoke—"

THIS OWL, however, got his start in a pine tree. It was a knob-cone pine—a rather scrubby conifer of the rocky slopes of the coast ranges in California. The slender cones are woody-hard and colored like fresh-roasted coffee. They are tenacious things, often staying on the branches till increasing diameter-growth thrusts them off or, failing in that, envelopes them in wood. Whether the cones fall or whether they don't, they are as "tight" as the proverbial Scotsman. Only under the heat of a forest fire do the close-lapped scales curl back slowly to let the wind flutter the winged seeds over the devastated area. For the sake of the knob-cone species, and also for the sake of the bared soil, this fire-opening is a lucky provision of Nature.

If it were not for constant vigilance of California foresters, the knob-cone pine cones would open pretty frequently in these days of automobiles and cigarettes. Thanks to that vigilance, however, life often becomes rather dull for the patiently waiting seed-cases. Some ingenious Californian took pity on this one, cut off a few of the basal scales to make the "owl's" flattened face, sharpened the woody stem that protruded, painted on the eyes, and left the close-pressed scales to simulate the plumage. This one serves as a mantel ornament. Perhaps, some day, the grate fire will get hot enough to lift the plumage-scales, scatter the seed, and astonish the pine-owl's owner.

THE HANDICRAFT OF WEATHER

By IVAN E. HOUK

The handicraft of weather, seen in the differing characteristics of plants and animals and in the sculpturing of the earth's surface, is all about us. This is true wherever we live. However, it is when we travel through the arid regions of western United States or through other scenic sections of our country, or along the upper limits of tree growth on the higher mountain ranges that we see the extraordinary effects of ordinary weather conditions.

Most of us think of weather as something to talk about when we have exhausted other topics of conversation, or to avoid entirely. Wind and rain, thunder and lightning, hail, sleet, snow and ice, all common characteristics of weather phenomena, we accept as things to be expected. But we are always interested in extremes of atmospheric conditions such as destructive storms or other pronounced manifestations of the elements. When a tornado occurs nearby we talk about the freak wind effects—straws driven into trees, mirrors carried miles without breaking, people stripped of their clothes without suffering bodily injury, and other erratic incidents of interesting, humorous, or serious aspect. But, when the wind blows and the rain falls, we seldom stop to think that these well-known elements of weather action, continued through the ages, have produced some of our most fantastic scenes of Nature.

Ordinary wind movements have gradually accumulated and sculptured the continually shifting but ever-

Wind and rain have combined their mighty forces to carve the fantastic pinnacles and domes of Bryce Canyon National Park of southwestern Utah. Photograph by Shipler. Below is Edwin Natural Bridge, in Natural Bridge National Monument in the same state. Photograph courtesy Colorado Association.

The size of these ripple-marked sand dunes, formed near the Mexican border in southern California, can be judged by comparing them with the figure of the man in the distance. Photograph from Bureau of Reclamation. The strange rock formation pictured below is known as the Temple of the Gods, one of the many strange results of wind and water erosion in Bryce Canyon. Photo by Shipler.

present, weird, undulating, sand dune formations that occur along the Atlantic and Pacific coasts, near the Great Lakes, and in the more arid sections of western United States. In the fifty-square-mile, sandy desert of San Luis Valley, south central Colorado, one of the largest inland bodies of drifting sand in the United States, wind forces, working continuously through the millions of years since the valley was first formed, have built up sand dunes eight hundred feet above the adjoining land.

The curving summits, cornices, coves and cliffs of the San Luis Valley dunes are constantly creeping back and forth as wind currents sweep the loose sand grains along the sloping surfaces. Yet people who visit this section of Colorado today see essentially the same sand-dune topography that Lieutenant Zebulon Pike saw when he reached the crest of the Sangre de Cristo Range on the east side of the valley in 1807; the same sandy scenes that the Spanish conquistador Juan de Zaldivar saw when he came up the Rio Grande from Mexico in 1599.

Wind movements in sand-dune areas often leave interesting ripple marks on the surface. Sometimes they uncover skeletons of animals or men who perished on the desert. Sometimes they expose ruins of prehistoric settlements. When Walter E. Hastings of the Michigan Conservation Department visited the Leelanau County sand dunes in the summer of 1935 he found that the strong winds that had blown off Lake Michigan the preceding spring had uncovered stone relics, weapons, implements, remains of camp fires, and other evidences of an ancient village, believed to have been inhabited by the Mound Builders.

The familiar elements of every day weather condi-

The most awe-inspiring of all works of erosion is the Grand Canyon of the Colorado in northern Arizona, where the combined efforts of wind and water have chiseled an enormous gash in the face of the earth. Photograph by the Bureau of Reclamation. Below, the author has photographed an interesting rock formation in the Bad Lands of southwestern South Dakota.

tions, working week after week, year after year, and century after century, since long before the advent of prehistoric man, have slowly modeled the unique, erratically-eroded canyon, plains, and mountain topography seen in various parts of western United States. Wind and rain gradually produced the fascinating cliffs, buttes and pyramids in the Bad Lands of southwestern South Dakota and northwestern Nebraska; the strange spires, monoliths, and domes of Hell's Half Acre near Casper, Wyoming; the fantastic, glistening pinnacles, minarets, and temples of Bryce Canyon National Park, southwestern Utah; and the variegated, gorgeously colored topography of the Painted Desert, eastern Arizona.

Similar weather conditions, aided by destructive effects of snow and ice, gradually created the natural bridges of southwestern Utah, the balanced rocks of Colorado, the tepee buttes of the Arkansas River Valley, and other queer natural manifestations seen in various parts of eastern United States as well as in the arid country of the West.

Probably no more magnificent results of weather handicraft are known than the deep, rugged, winding gorges that lend enchantment to our scenic mountain regions. Freezing and thawing temperatures, wind and rain erosion, and the scouring action of water running along the surface of the earth after it fell from the skies, slowly sculptured the Royal Gorge of the Arkansas River through central Colorado; the vividly colored canyon of the Yellowstone through Yellowstone National Park; and

One can almost see the wind sweeping across the ripple-marked desert of the San Luis Valley, Colorado. High-piled dunes can be seen in the background, and the Sangre de Cristo Mountains rise in the distance. The queer growth pictured below is known as Elephant Trunk Stump and can be seen near timberline in Rocky Mountain National Park. The fantastic shapes of many timberline trees are graphic evidence of the force of the elements. Photographs by Denver, Rio Grande and Western Railroad, and Haanstad.

the sublime, marvelously modeled, Grand Canyon of the Colorado—the most stupendous chasm in the world.

The great depths attained by these spectacular mountain gorges were gradually produced by river erosion, the slow wearing away of the stream bed by running water. But the fascinating sculpture of the side walls, the talus slopes, the towering, jagged cliffs and pinnacles, the intersecting side canyons with their individual scenic characteristics, were produced, primarily, by local wind and cloudburst erosion. This is particularly true of the Grand Canyon of the Colorado.

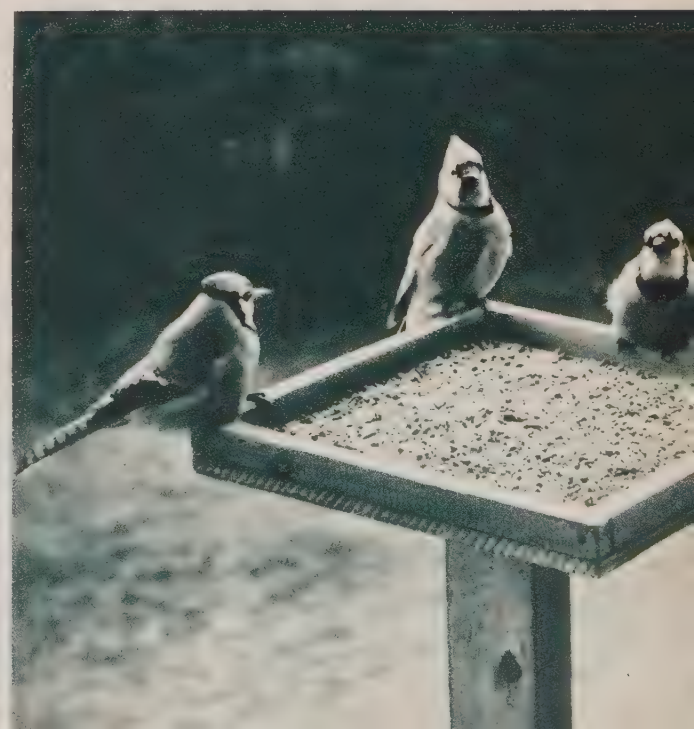
The student of the outdoors who stands on the brink of the Colorado River gorge, who looks across the twelve-mile kaleidoscope of colored grandeur, who gazes down into the five-thousand-foot depth of fantastic cliffs, rocky crags, rugged prominences, and sharply delineated geological strata, is witnessing the ultimate of weather achievement. Go where he may, he will never see a more magnificent, awe-inspiring effect of weather handicraft than the Grand Canyon.

Patience With Bluejays

A bushel and one-half of cracked corn and barrels of patience were used up before F. Seymour Hersey finally succeeded in making the bluejay pictures on this page. Bluejays are often described by those who play host to birds in the yard as quarrelsome and bold fellows. They are, nevertheless, shy birds, perhaps because they feel they must be on guard against revenge from those they have been bothering.

In any event, Mr. Hersey found his bluejay guests extremely wary when he first built a feeding tray fifteen feet from his window. They soon became regular feeders, but both light and distance made the pictures taken a failure. So another tray was built closer to the house and the birds began to visit it. At first they came stealthily and only after they had eaten all the corn on the first tray. Then a third tray was installed six feet from the window. The placing of food was discontinued on the first tray, then on the second.

After several weeks a wide board with a hole in the center was cut to fit under the raised window sash. The camera lens was pointed through the hole. The jays were doubtful about this at first, but in a week accepted it. All then seemed in readiness for pictures, but at the first click of the shutter the birds left, a blur of wings on the film showing the speed of their departure. A further period of training was necessary and so the shutter was snapped in an empty camera whenever a bird visited the food. Finally the jays lost their extreme fear of the noise, although they never have become entirely used to it. Here are Mr. Hersey's proofs of his patience.



The Angel-Wing Shell And Its Inhabitant

By IVAN R. TOMKINS

The beautifully fluted angel-wing shell, ***Pholas costata,*** is found on the Atlantic Coast from Massachusetts to the West Indies and is often picked up on the beaches, but few ever see the creature whose self-constructed home it is, or know how and where it lives. Certainly a shell so thin and fragile never was intended to stand the pounding of heavy surf, nor could its owner safely burrow in broken oyster shells or among rocks.

One day, while wandering along the beach at low tide, I found, in a shallow pool of water, a hole a half-inch in diameter with two siphons, from and into each of which rippled a constant flow of water. Here was something to be investigated. I dug into the fairly hard mixture of sand and mud, and every time the siphons were touched they withdrew farther. A foot down there was an appreciably softer place about three inches across, and when my elbow was about covered with water, I touched a rough shell, and finally with care withdrew it. Washing-off of the sand and mud disclosed a perfect pair of angel-wings. The long siphons had reached up the fourteen inches or more to the surface to draw in the food-bearing waters.

These creatures are sightless, without hearing or the sense of smell in the ordinary meaning, and are firmly

rooted in one place. Their only contact with the outer world is through the tubes that attend the ebb and flow of the water overhead on the ocean floor. Yet the will to live is inherent in all creatures, and by following the easy path of life, this animal has found a blind alley in which the means of sustenance lies at its door, and the very isolation of its retreat protects it from many of the creatures that might be enemies, were it more accessible. Life under such circumstances becomes simple. Other species of *Pholas* inhabit the coasts of Central America, Peru and India.

The angel-wing shell long has been a favorite of collectors, whether children or more erudite gatherers, and, although fragments of broken shells scattered on many beaches show how numerous these mollusks are, perfect pairs are seldom found because of their fragility. If two of the shells are matched up with the rounded side uppermost, it is easy to understand the reason for the name, for the resemblance to the old paintings of wings of angels is evident. With beauty in every line, these shells stand out among their neighbors. Still, as great as their beauty appears to us, these shells were developed for utility, and the curves and divergent rows of spines, as well as the reinforcement on the inner margins, are there because they aid in the practical life of the animal within. A similar mollusk lives in peat or soft rock, always, I think, when these are overlaid with a few inches of sand or mud. The burrows are bottle-shaped and show that the bivalve starts to drill when small and gradually makes a prison from which there is no escape. These rock burrows show the lines scratched by the spines of the lower part of the shell, and that in drilling the animal revolves. Doubtless the angel-wing burrows in much the same manner.

Chippy Never Learned

By C. G. DITTMER

At the cottage by a lake in northern Wisconsin this little chipmunk soon knew there was to be a supply of peanuts when I took my seat under the trees not far from his hole. Within a day he was taking them from my hand or trying to chew to them through my pocket. He seemed never to learn to go directly to the source of supply through the proper opening. If his fellows came too near he fought them off, and if I tossed them peanuts he scolded me soundly.

Chippy succeeded so effectively in establishing a corner on the supply that I decided to make him work for his living. A handful in a milk bottle was the means. He undoubtedly recognized the peanuts by sight, for long before he discovered the opening at the top he did his best to bite through and burrow under the glass. Once he succeeded in tipping the bottle over and thus got his nuts easily, but I did not permit this to happen again.

Having learned that they really were accessible, he was soon on top of the bottle reaching, peering, chattering, dashing off and back again, letting himself part way down and out again like a flash. And then the great adventure! He dropped to peanut level—the bottom of the bottle. He took one in each pouch and one between his teeth and then came the struggle to get out, but the neck of the bottle was now too small. He jumped and reached and squeezed and as he became more and more excited he discarded the peanuts in his pouches but never admitted defeat or tried to get out "empty handed." With one loosely held by the end between his teeth, often toward the end of the process just pushing it before him and letting it topple over the side, he always got just one peanut and never more. A dash to his hole and he was back for more. Never did he learn by experience not to be too ambitious. He invariably filled his pouches, discovered that he could not get out, grew panicky, discarded two, seized one, and "scrammed." He would take the better part of a morning to transport a pint of peanuts, and before I left for the city had added quarts to his store.

THE FIRST sight of blooming goldenrod brings sad thoughts to many lovers of the outdoors, for its coming portends the passing of summer's beauties. But there is a better way to view the matter, for autumn and winter are as much a part of Nature as are spring and summer, and have duties fully as important in her economy. The wise Nature enthusiast, therefore, will put aside repining thoughts and resolve to welcome each season as it comes.

The hairy goldenrod, *Solidago rugosa,* is one of our more widely-spread species, and by reason of its size and vigorous growth, one of the more important as a contributor to autumn beauty in many sections.

Giant sunflower, *Helianthus giganteus,* ranges from Maine to Saskatchewan, southward to Florida and Louisiana, and west on the plains to Colorado. When Kansas chose the sunflower for its state emblem, it undoubtedly had in its official mind this conspicuous species. In late summer and early autumn this showy native lends its golden beauty to many a scene that otherwise would be drab and cheerless, and although the plains country has many plants of surpassingly colorful beauty, one has no fault to find with the philosophy that led to the choice of the sunflower.

Usually confused with the mosses, but differing greatly from them in structure and life-history, are the club-mosses. Many call them running-pine, and under this name they have been all but exterminated in many places for Christmas decorations. The one here pictured is *Lycopodium clavatum.* It is a plant of ancient lineage, as is shown by its wide distribution in North and Central America, and over much of Europe and Asia. When one walks through a patch of the fruiting plants in early summer, the ripened spores fly in yellow clouds. The highly inflammable quality of these spores formerly led to their wide use in the production of certain stage effects. These three photographs by L. W. Brownell.

Common mole, *Scalopus aquaticus,* facing the camera. Not much intelligence expressed in its face, but look at the front feet so perfectly adapted for tunnelling. Then glance at the bottom of the page. At the right are the head and forelegs of the mole, and facing it the head and burrowing feet of the mole cricket, *Gryllotalpa borealis,* much enlarged. The similarity between the digging equipment of the two widely different forms is a graphic example of convergence or homoplasty.

What is Convergence?

By PAUL GRISWOLD HOWES

In the world of living things, we frequently find two unrelated animals that exhibit a striking resemblance, either in the form of their bodies or in some particular structure. When such resemblances mean merely that the two organisms are similarly adapted to their mode of life, they are called examples of convergence, or, perhaps, by the less pleasing term, homoplasty.

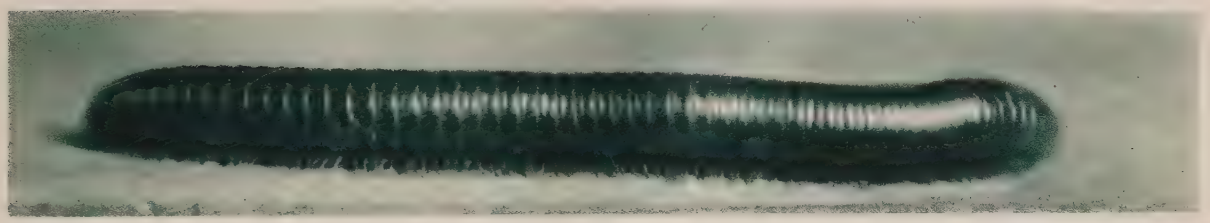
Not so long ago, when naturalists were less thoroughly informed, absurd mistakes in classification were made because convergence was not understood, and some of these errors stood uncorrected for surprisingly long periods.

One of the classic cases concerns the centipedes and millepedes, which until quite recently were invariably grouped together as the Myriapoda, simply because both kinds of animals possessed long, segmented bodies, many pairs of legs, one pair of antennæ, and general forms that were nicely adapted to the same sort of a life. These animals illustrate convergence very nicely. Actually they are not at all closely related, as careful observation will reveal.

In the light of our present method of scientific approach, it is difficult to understand the carelessness and haste that led to such mistakes, but it happened all too often, with the result that very different animals were so classified as to appear closely related.

When next you uncover a common centipede when cleaning up rubbish or searching under logs and stones

Above we see the slender centipede; below the millepede. These once were regarded as close relatives; actually they are widely different in structure, their manner of life being the only common attribute.



for specimens, look carefully at its body. You will see that it is rather flattened, and that it is made up of many rings or segments, to each of which are attached a *single pair* of legs. Notice also that the centipede's antennæ are made up of rather numerous joints, and, if you have a lens, carefully observe the *three pairs* of mouth parts and the first pair of legs, which have evolved into powerful poison-claws.

When you turn up a millepede, observe it closely also. You may handle these slower moving creatures without danger because they possess no poison-claws, nor do they make any effort to protect themselves other than to roll up like a watch spring. Notice that the millepede's body is almost cylindrical and to each body ring, except the first three, there are attached *two pairs* of legs. In addition to these radical differences from the centipede the millepede's antennæ are but seven-jointed, there are only *two pairs* of mouth parts, and there are other more complicated anatomical differences that show plainly that these two animals are headed along different evolutionary courses. They exhibit similarly adapted forms because of the conditions under which they live, but there their likeness ends.

Other remarkable cases of convergence may be found right at home. Look at the photographs of the common mole and the mole-cricket. These two creatures have almost nothing in common except their mode of life. They rest upon widely separated branches in the biological tree of life, yet they show convergence remarkably well.

Homoplasty has done the job, one might say, and alone, for the remarkable similarity in the excavating limbs of insect and mammal has nothing whatever to do with modification from a common ancestral type.

Cases of convergence are well worth hunting for. They are of particular interest to the student of Nature and science because they illustrate one of the most interesting facts of biology, and their discovery means the sharpening of the observational sense.

A few suggestions for study may be helpful.

Notice that the bills of swifts and swallows, two widely separated groups of birds, are similarly adapted. Think of the curious fin-like wings of a penguin and the "flippers" of a seal; or note the commoner instance of convergence in the stream-lined body of the cold-blooded mackerel and the equally graceful lines of the dolphin, which is a warm-blooded mammal in disguise.

The game of convergence makes good hunting and it is interesting to see what you can bag.

White Pines and Weather

Like some weird fairy-tale wood is this strange bit of forest in Greylock State Park in northwestern Massachusetts. They stand, however, merely as an example of the caprices of the weather.

This grove of white pines was planted in 1918. Early in 1921 Massachusetts suffered a severe ice storm, and forest and shade trees were badly damaged. The ice weighed down and bent the young trees, then six or seven years old and good healthy stock, and the heavy snows that followed held them in unnatural positions. When spring came the trees made a valiant attempt to come back to normal growth. Either the leader of each tree grew upward, seeking the sun, or a branch carried on the work of growth. The fantastic shapes of ninety percent of the trees in the grove tell the story of the storm of their youthful days. Many of these trees now have been pruned, with the result that their strange character is even further accentuated.

These pictures of Greylock Park, Savoy, Massachusetts, were made by Arthur Palme of Pittsfield.

"An' the Gobble-uns'll git you ef you don't watch out!" Has anyone ever seen a more villainous looking monstrosity than the leader of this goblin band pictured in the center? Even the chief goblin's horse and his trained hippopotamus, thinking of the evil deeds to be done when the clock strikes twelve, have anticipating glints in their eyes. Creatures with faces like these would not be pleasant to meet on a dark moonless night.

These are the seed pods of the common snap-dragon flower of our gardens, *Antirrhinum majus,* photographically enlarged. Look closely at the group below. Some seem to be singing lustily, others appear quite mournful, and, we must admit, one or two look very much like some people we know. This interesting series was photographed and sent to us by Ruth F. Fryklund of Audubon, Iowa.

HABITAT GROUPS AT CARNEGIE MUSEUM

The tropical beauty of southern Florida, the Alpine atmosphere of mighty Mount Rainier in the northern Cascades, and the sterner glamor of Arizona's desert are all on view at the Gallery of Botany, Carnegie Museum, Pittsburgh. These distinctive habitat groups are the result of the untiring efforts and infinite patience of Ottman von Fuehrer and his wife, Hannah.

The Florida exhibit, here pictured, required eighteen months' work, including two months spent in the swamps and jungles of Paradise Key, where Mr. and Mrs. von Fuehrer made molds and sketches for the group. Eight thousand separate leaves, flowers and blades of grass, all modeled in wax, are used in artist-botanist von Fuehrer's reproduction of a typical jungle scene. Each of the 8000 units was made individually, and they were assembled exactly as they appeared in the natural scene.

Here, on the limb of the live oak, we see the spreading sprays of the butterfly orchid, and, farther down, an air plant, *Tillandsia fasciculata.* In the crotch of the tree is a fine specimen of the chintz-flowered orchid, *Oncidium undulatum,* with thick paddle-like leaves and graceful spreading sprays of cream-colored flowers with yellow and red centers. The large fern is a sword fern, *Nephrolepis exaltata,* widely distributed in tropical countries from Florida to Brazil, and also in Asia and Africa, from which, in hot-house cultivation, have been developed many varieties, including the Boston fern.

The Mount Rainier group, a replica of a sunlit valley high on the slopes of the mountain, also contains about 8000 flowers reproduced in wax and celluloid. Six weeks were spent in the field preparing color sketches and making detailed drawings and color notes of the flowers. More than a year was required in the laboratory to assemble this group. To Mrs. von Fuehrer fell the painstaking work of creating the leaves, flowers and other accessories of wire and wax to represent the central theme of the display, the Alpine flora. In fashioning these flowers, Mrs. von Fuehrer begins by making molds of the leaves and petals in plaster of Paris. Then, with

color notes and drawings as a guide, she records the exact appearance of the bloom at the time the mold was made. Wax then is poured into the molds, and the synthetic flower takes shape. When hardened, the flower is fitted with a stem and leaves and painted. Thousands of blossoms, too small to be prepared in wax, were cut by Mrs. von Fuehrer from thin celluloid. The ground squirrel on the rock in the foreground is included for size-comparison purposes.

Our other pictures show Mr. von Fuehrer sketching

scenery for the background of the Mount Rainier group, and Mrs. von Fuehrer putting the finishing touches on the Alpine fir that was prepared by the celluloid method.

The Arizona desert scene is a replica of an area in the country of the Papago Indians, a region where sunshine is plentiful but rainfall is scarce. Weeks were spent in the field collecting specimens and making the plaster "negatives" of the fourteen foot baby giant cactus and the barrel cactus. Later, in the laboratory, they were reproduced in wax and the 4000 natural spines were replaced in their proper positions on the models. In addition, several hundred flowers and more than two thousand leaves, also made by Mrs. von Fuehrer, were required to complete the group. In the foreground are a gila monster and a tarantula, fit companions of their spiny associates.

★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

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WILDLIFE AID FROM GUN TAXES ★

Describing it as "epoch-making in the history of wildlife conservation", the Biological Survey announces the approval of an act making available funds from Federal taxes on firearms and ammunition for improvement of wildlife conditions. Such funds are expected to total about $3,000,000. Provision is made for diversion of most of these funds to the various states, in part in proportion to the number of hunting licenses sold. The act is to become effective on July 1, 1938. Three millions of dollars (if that amount accrues) represent a sales turnover each year of thirty millions of dollars' worth of guns and ammunition.

We still possess a sixteen-gauge double hammerless shotgun. In expert hands, and directed by a keen eye, such a gun has tremendous capabilities for destruction. Fortunately, nearly twenty years have elapsed since it has been fired, but it could easily have been in active use all this time. Had this gun been subject to the tax now imposed, it would have produced $2.00. Then, of course, there would have been a few dollars each year from the shells that would have been shot at the ducks, grouse, quail, woodcock, rabbits, squirrels and other small game. Does anyone really believe that the taxes resulting from the activity of this gun, expended for the improvement of wildlife habitat, would have offset the thousands of birds and small mammals that would have fallen before it? Suppose this gun were now brought *again* into use, and that from it a thousand shells were shot at game each year. These might kill two hundred head of game annually. To replace these birds and mammals there would be available about four dollars each year. Does anyone believe that four dollars could do the job? We don't believe it could, and we don't believe anyone in the United States who knows anything about such things believes it. And if it would not work for one gun, how would it work for ten million guns?

The ideas back of this act are not new. In principle it resembles the Federal hunting license and the duck stamp, for about fifteen years the goal of the hunters. Its origin is perhaps indicated in the report of hearings held in the spring of 1934 before the special Committee on Conservation of Wildlife, House of Representatives, A. Willis Robertson, Chairman. Thomas M. Beck, of the Crowell Publishing Company and a member of the President's Committee on Wildlife Restoration, was discussing ways and means to this end. Mr. Bolton, a member of the House Committee, asked:

"If the program were carried into effect, what would be the annual cost of it?"

Mr. Beck: "The annual cost would be taken care of if we could divert the amount of money paid as taxes by the arms and ammunition manufacturers. The arms and ammunition manufacturers are willing to give up for this purpose the 10 percent that is collected from them, which amounts to about 1¼ million dollars annually. That is the nuisance tax that the arms and ammunition people have been paying. They are willing to have that tax continue indefinitely if it is diverted to the maintenance of this program. That would be plus the income from duck stamps.

"A bill should be introduced to divert the money to our purpose, because it now goes into the general fund, and you cannot get it unless a law is passed to make it available."

We quote from a press bulletin issued by the Department of Agriculture on September 3, 1937:

"In reporting the bill, the Senate Special Committee on Conservation of Wildlife Resources said:

" 'The provisions of this bill have been endorsed in principle by: The General Wildlife Federation, the Izaak Walton League of America, the International Association of Fish and Game Commissioners, the Western Association of Fish and Game Commissioners, the American Wildlife Institute, More Game Birds in America, New England Fish and Game Conference, the administrators of the conservation departments of 39 States, the General Federation of Women's Clubs, the Garden Clubs of America, and other conservation groups, agencies, and in-

dividuals throughout the country.' " Strange bedfellows.

It is not difficult to understand why an act that increases the financial strength of Federal and state organizations is endorsed by these agencies. However their leaders may think as individuals, as officials they dare not refuse to administer funds placed at their disposal by law. And we can readily see why most of the national and sectional leagues and associations listed by the Department are for it. Such action is distinctly in line with their usual practice. But we are astonished that the General Federation of Women's Clubs and the Garden Clubs of America, apparently deluded by its plausibility, threw their influence in favor of the measure. Surely such action could not have resulted from any serious study of the matter by the supporting membership of these great organizations. We predict that their action will be bitterly regretted.

What will this law do *for* our game? It will furnish jobs to many people who are content to consider conservation as a game in which its proponents merely follow the line of least resistance, drifting along with the tide while our wildlife is steadily reduced by commercialism. Its benefit to game will be negligible.

How will this law operate *against* game? By assuring continued open seasons on both migratory and resident game, and by retarding restrictive measures everywhere. The more guns and shells—the more tax money. It will thus supplement the harm done to the waterfowl by the duck stamp, and will extend the same pernicious principle to the administration of resident game.

We believe that this act is outstanding among recent legislation in its potentialities for harm to the wildlife it purports to help.

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WILDLIFE ★ ★ RESTORATION WEEK ★ ★ ★

There is always a penetrating understanding to be found in the daily drawings by George Clark, syndicated by the N.E.A. Service and published in the Scripps-Howard and other newspapers. This quality is well exemplified by the cartoon reproduced herewith. It produces a smile, but it is a wry smile that comes in recognition of a barb well aimed at one of our human frailties—this time, lack of vision. The legend Mr. Clark put beneath his drawing is, sadly, all too true. In fact, it provides us with an excellent text.

SIDE GLANCES . . . . by George Clark

"Have you any old empty cans? We're hunting for something to shoot at."

Next year the week of March 20 is to be proclaimed National Wildlife Restoration Week. Its object will be to focus attention on our diminishing wildlife resources; to stimulate the raising of funds for restoration and the increase in refuges and improvement of areas suitable for wildlife. There will be an active campaign of public education that we hope will present the facts and not the fiction of the situation confronting our wildlife. We will lend our aid to this end by continuing to present these facts in the future as we have done in the past—and without fear or favor.

There is, however, one factor ignored in every fanfare about wildlife restoration. It is the axiom that you cannot have your cake and eat it, too. You cannot spend your principal and look forward to an easy old age. Yet with respect to wildlife we are trying to make exception to the rule of self-evident fact, and we are not getting away with it. Witness Mr. Clark's cartoon.

Furthermore, when we have suffered a serious illness, once the offending germ is out of our system we do not immediately take up our usual labors. The doctors insist that we should rest, build up our strength and reserve and otherwise prepare ourselves for the rigors of daily life. Many species of our wildlife are so run-down in strength, so utterly without reserve, that they sadly need a period of quiet convalescence. Without much hope of acclaim at the suggestion, we propose that the week of March 20 be designated National Wildlife REST Week, and that the week be extended until an adequate reserve is built up to assure that our wildlife will continue to be with us.

"UPON THY BELLY SHALT THOU GO..."

By
ELSIE A. PARRY

Wherein we find that Scripture and classic literature have given the snake its bad name

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Illustration by R. Bruce Horsfall

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"THEN, OUT OF A CLEAR SKY, SOMEBODY WANTED TO KNOW HOW THE SERPENT PROGRESSED BEFORE GOD SAID TO HIM, 'UPON THY BELLY SHALT THOU GO.'"

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"WELL, I think he revolved on his tail—you know, like one of those whirling dervishes. . . !" The dignity of the seminar in English Literature collapsed in a shout of laughter.

"No, no!" someone clamored. "I think he traveled like an inch worm making fancy scallops in the air. . . ."

And the argument was on. No one would have guessed that a few moments before we had been in the midst of a solemn discussion of *Paradise Lost*. Miss Letson had discoursed learnedly on Milton's use of verbs in Book I, and we had given her paper polite but bored attention. Then, out of a clear sky, somebody wanted to know how the serpent progressed before God said to him, "upon thy belly shalt thou go."

"But a snake doesn't go on his belly; he walks on the ends of his ribs!" That was Myra Watts, of course. She's a Scout leader, or something, and keeps a puff adder named Michelangelo for a pet. But her knowledge of present day snake propulsion threw no light on previous styles.

We tried to imagine the serpent with numerous feet, but that made him a kind of cross between a centipede and a caterpillar. One student thought he might have resembled the dragons of the fairy tales, with less of a snake's sinuous length to manage. Milton, however, evidently allowed him a serpent's full quota of coiling yards, for he describes him thus before the advent of Satan:

> ". . . the serpent fast sleeping soon he found
> In labyrinth of many a round self-rolled,
> His head the midst, well stor'd with subtil wiles;
> Not yet in horrid shade or dismal den,
> Nor nocent yet, but on the grassy herb
> Fearless, unfear'd he slept."

And yet in Book VII of *Paradise Lost* Raphael says of the serpent:

> "The serpent, subtlest beast of all the field,
> Of huge extent sometimes, with brazen eyes
> And hairy mane terrific, though to thee
> Not noxious, but obedient at thy call."

Evidently a more dragon-like creature.

"Perhaps he rolled like a hoop snake." This from the Professor, who had thoughtlessly hung both long legs over one arm of his chair, so intense was his interest in the discussion. But Myra Watts hooted the idea that the hoop snake makes its way in the world by taking its tail in its mouth and rolling along.

"Well, maybe the Garden of Eden serpent did!" The Professor was loath to relinquish his inspiration.

"Snakes are horrid, all of them, no matter how they walk!" Miss Letson declared fervently.

"Milton certainly didn't think so," I said. "Listen to this:

> ". . . and toward Eve
> Address'd his way, not with indented wave,
> Prone on the ground, as since, but on his rear,
> Circular base of rising folds, that tower'd
> Fold above fold, a surging maze, his head
> Crested aloft, and carbuncle his eyes;
> Amidst his circling spires, that on the grass
> Floated redundant; pleasing was his shape,
> And lovely . . .' "

Beautiful, but wicked, alas!

Personally, I think that the snake has been the victim of a conspiracy to deprive him of his good name. The Biblical prophecy, "and I will place enmity between thy seed and her seed; and it shall bruise thy head, and thou shalt bruise its heel," has been literally fulfilled. The abhorrence felt by most people for all members of the snake family can be traced in the majority of instances directly to the story in Genesis. Young children have no instinctive fear of snakes. They develop fear of them through the warnings of their elders, whose dislike is hardly attributable to actual physical terror, inasmuch as most snakes are not only harmless but actually beneficial. W. H. Hudson explains the situation well:

"So far back as memory carries me I find the snake, in its unwarrantable intrusion on the scene, ever associated with loud exclamations of astonishment and rage, with a hurried search for those primitive weapons always lying ready to hand, sticks and stones, then the onset and the triumphant crushing of that wonderfully fashioned vertebra in its scaly vari-coloured mantle, coiling and writhing for a few moments under the cruel rain of blows, appealing not with voice but with agonised yet ever graceful action for mercy to the merciless; and finally, the paean of victory from the slayer, lifting his face still aglow with righteous wrath, a little St. George in his own estimation; for has he not rid the earth of another monster, one of that demoniac brood that was cursed of old, and this without injury to his sacred heel?"

Hudson, however, also points out that "believers in an instinct in men inimical to the serpent might still argue that the Scriptural curse only goes to show that this reptile was already held in general abhorrence—that, in fact, the feeling suggested the fable." Yet veneration of the serpent as a beneficent power has always existed and indeed still survives in a great part of the world, as in Hindustan and other parts of Asia, in Madagascar and many places in Africa, as well as in sections of Europe.

Although the precedence of feeling over fable, or fable over feeling, is as incapable of proof as that celebrated question relating to the chicken and the egg, the fact remains that writers, from the chronicler of Genesis on, whatever their source of information concerning the wickedness of serpents, have, as Sir Thomas Browne remarked, "much enlarged the opinion of their mischief." Consider this, for instance, from the *Aeneid*:

"Lo! o'er the tranquil deep from Tenedos
Appeared a pair (I shudder as I tell)
Of vastly coiling serpents, side by side,
Stretching along the waves, and to the shore
Taking swift course; their necks were lifted high,
Their gory dragon-crests o'ertopped the waves;
All else, half seen, trailed low along the sea;
While with loud cleavage of the foaming brine
Their monstrous backs wound forward fold on fold.
Soon they made land; the furious bright eyes
Glowed with ensanguined fire; their quivering tongues
Lapped hungrily the hissing, gruesome jaws."

Or this from Book VII:

". . . From her Stygian hair the fiend
A single serpent flung, which stole its way
To the Queen's very heart, that, frenzy-driven
She might on her whole house confusion pour.
Betwixt her smooth breast and her robe it wound
Unfelt, unseen, and in her wrathful mind
Instilled its viper soul. . . ."

Snakes as a means of inflicting torture are common in classical literature. Milton probably had in mind some of the classical instances when he describes Sineas:

". . . ending foul in many a scaly fold
Voluminous and vast, a serpent arm'd
With mortal sting. . . ."

Aeneas saw the dread Tisiphone in Tartarus:

"There, armed forever with her vengeful scourge,
Tisiphone, with menace and affront,
The guilty swarm pursues; in her left hand
She lifts her angered serpents. . . ."

So fixed, from constant repetition, have these and similar notions concerning snakes become in the mind of the average person that he remains forever incapable of appreciating, for instance, the wonder of a snake's motion, which Ruskin describes with such beauty:

"That rivulet of smooth silver—how does it flow, think you? It literally rows on the earth, with every scale for an oar; it bites the dust with the ridges of its body. Watch it when it moves slowly; a wave, but, without wind! a current, but with no fall! all the body moving at the same instant, yet some is to one side, some to another, and some forward, and the rest of the coil backwards; but all with the same calm will and equal way—no contraction, no extension; one soundless, causeless march of sequent rings, a spectral procession of spotted dust. . . ."

"'One soundless, causeless march of sequent rings . . .'" repeated Myra Watts, breaking the class's thoughtful silence. "It hardly matters, does it, how the snake walked before his downfall? What greater beauty of motion than this could he possibly have achieved?"

We let the matter rest there. The snake, as I said before, has been the victim of a conspiracy to rob him of his good name.

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To a Water Lily

By NATHALIE THURSTON SHELTON

O star of purest whiteness smiling there
Upon a floating bed of padded green.
Through patient toil your head has reached the light
And in your golden cup is seen the glow
Of dawning day. Your scent is perfumed with
The breath of Heaven's sweetness, and your heart
Is quiv'ring with a vibrant joy of life.
For three short days your beauty is displayed
Then gone forever from the sight of man.
So great an effort spent in one short life!
And was it lived in vain? I answer "No",
For beauty is eternal. Fashioned by
The gracious hand of God it lends to earth
For man to view, a tiny glimpse of Heaven.

Things to Think About

Refuge: "A shelter or protection from danger or distress; a sanctuary; a place inaccessible to an enemy; a retreat." So says Webster's unabridged dictionary. The Secretary of Agriculture, however, under an order dated September 28, has permitted shooting of waterfowl on certain areas within the Upper Mississippi River Wild Life and Fish Refuge (classed as a "Super Refuge"), during the period of October 9 to November 7 in Iowa, Minnesota and Wisconsin, and November 1 to November 30 in the state of Illinois. Thus there will be 52 days of shooting on what is supposed to be "a retreat" or "a sanctuary;" 52 days of killing on "a shelter or protection from danger."

Under date of October 1, 1937, the Secretary of Agriculture authorized the shooting of migratory waterfowl, except those protected by law, and coots, on the shooting ground portions of Lake Bowdoin Migratory Waterfowl Refuge (a "Primary Refuge") and Red Rock Lakes Migratory Waterfowl Refuge (a "Super Refuge"), in Montana. These announcements seem merely to reaffirm the action of 1936, applying it to the 1937 open season.

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We have always favored abolition of "roadside zoos," those usually inhumane, cramped cages or inclosures adjacent to highway refreshment stands in which some bird or animal is kept as an attraction to draw trade from passing tourists. A step in the right direction is a law passed by the Michigan Legislature setting up strict requirements for those seeking permits for "zoo" operation. Under the regulations, inclosures must be roomy enough to permit adequate exercise, must be kept clean, and must be placed to protect the occupant from unfavorable weather and direct rays of the sun. At no time is the owner permitted to tether animals or birds to stakes or trees. No wild thing is content to be kept in cages, and it is to be hoped that these unnecessary roadside menageries will disappear because of increasing regulations. Connecticut, of course, has the *best* roadside "zoo" law; in that state they are forbidden.

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Members of the Massachusetts State Department of Agriculture have honored Mrs. Alice Bowers Harrington, whose recent retirement marked the end of forty years of continuous service in that body. Mrs. Harrington gained considerable distinction among ornithologists for her knowledge of birds and their habits, and for fifteen years was secretary to the late Edward Howe Forbush, State ornithologist, whom she assisted in the writing of *The Birds of Massachusetts and Other New England States.* She has lectured extensively on New England bird sanctuaries, and, as a member of the conservation committee of Massachusetts State Federation of Women's Clubs, often gave special talks on the radio. She is a member of many conservation groups and her home in West Acton, Massachusetts, is a mecca for bird lovers.

Inspired by news of the death of nearly an entire family in Wisconsin, supposedly the result of eating chicken that had consumed poison grasshopper bait, and the frequent loss of livestock from the same cause, the South Dakota Conservation Digest for June, 1937, makes these observations:

"Quite similar to the grasshopper poisoning campaign is the flickertail and gopher extermination program in which poisoned oats are used. Not infrequently we read a newspaper account of the loss of livestock and in some cases death of humans attributed to such poison campaigns and too much cannot be said in warning the public of the dangers involved.

"Grasshopper bait to be effective should be strewn in particles so small that the possibility of any of it being taken by beneficial wild birds, domestic poultry or livestock would be extremely remote, if not impossible.

"Poisoned oats used in flickertail and gopher control should be deposited in the burrows to insure its consumption only by the pest whose control is sought.

"We do not wish to be understood as desiring to interfere with any legitimate control methods necessary to the successful pursuit of farming operations, but we do wish to sound a warning in hopes that necessary control methods may be carried on without serious effects which, if they become too common, will most certainly result in banning entirely the use of poison in pest control."

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Ample proof that closed seasons would solve the problem of our disappearing waterfowl is contained in a statement from the Department of the Interior that the trumpeter swan, largest and handsomest of our native waterfowl, is increasing. This bird, one of those on the protected list, has only two breeding grounds in the United States: Yellowstone National Park and the nearby Red Rock Lakes Refuge in Montana. Facing extinction four years ago, with less than 50 of the birds inhabiting this country, its numbers in 1936 were found to be 114. This year's figures estimate the number now inhabiting the same sections to be 158.

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Our nation needs more municipal parks. A nation-wide study of these parks, just completed by the National Park Service and the National Recreation Commission, reveals that although municipal park acreage increased 49 percent in 655 identical cities checked in 1935 against 1925, a large percentage of our cities fall far short of attaining the 25-acre average of the American municipal park. It was also reported that little progress has been made in the acquisition of a sufficient number of children's playgrounds, and that such areas only represent five percent of the total park acreage reported.

Parents, Children, and the Outdoors

Bird study and Nature study are of value in building character and welding the family into a closer unit

By ELIZABETH GRUNDER

Illustrated by R. Bruce Horsfall

LEARNING THAT THE BILLS OF BIRDS ARE ADAPTED TO THEIR DIFFERING CONDITIONS OF LIFE IS A LESSON IN THE IMPORTANCE OF ADAPTABILITY TO THE MANY SITUATIONS OF HUMAN EXISTENCE

WHEN my husband and I chose bird study as a mutual hobby we did not realize at first that we had, unwittingly, stumbled upon the magic highway to better parenthood.

At first we included our two small children in our field trips merely for the pleasure we thought they might derive from them. But after observing and meditating upon their reactions to these outings, the fact began to dawn upon us that we had discovered an easy, delightful way to instill into our children the precepts of character upon which at home we had apparently so often preached in vain.

The actual mechanism of bird life is fascinating to a child. For example, the feeding habits of the various types of birds furnish material for much thought and conversation. The herons have long necks and legs because they are wading birds and must be able to reach food in the beds of streams; the grosbeaks are seed-eaters so they must have strong, heavy bills to crack seeds; the birds with the long, sharp bills feed largely on insects and worms. Facts such as these silently offer a lesson in adaptability. Without conscious effort the child learns that the easiest and best way to get along in this world is to adapt oneself to one's surroundings. An individual who has learned this lesson has gone a long way toward being well-adjusted to life and its problems.

It is astonishing how rapidly a child can learn to identify and distinguish different birds. As each new bird is discovered the child seeks out all the information he can about it. He wants to know what it eats, how it builds its nest, and all the other details of its individual and family life. Right there are invaluable lessons in human relationships. In watching both parent birds build the nest, and, later, care for the young, the child learns to think of the family as a unit, whose individual members must cooperate for the benefit of the whole. And so, transferring his thoughts from bird families to human families, he sees himself, for the first time perhaps, as a part of a harmonious whole, rather than as an individual in antagonism to other individuals.

When the child can be made to realize this fact, he gradually begins to understand why parents do as they do. He sees the significance of tasks and apparent restrictions that before only irked and irritated him. With the growth of this understanding comes a declining resentment against parental authority and a lessening of disciplinary problems.

Here, in the observation of bird family life, is the golden opportunity for parents to instruct their children in the facts of sex life in a wholesome, natural way. This part of a child's education is difficult, under usual circumstances, for so many parents. But out in the fresh air and sunshine, with an interesting, concrete example before them, discussions and confidences between parent and child flow easily, and the story almost tells itself.

The child's awareness of color, shades and tones is sharpened by his contact with Nature. He notices the different hues and colors not only of the birds but of their surroundings, the flowers, shrubs, trees, and that ever-changing, ever-beautiful background, the sky.

By pointing out to the child the harmony of contrasting and analogous colors and the beauty in form and line of living things, the parent imparts to him his first principles of art appreciation. This is the opening of the door

to a land of limitless possibilities for enjoyment and spiritual satisfaction.

He learns to distinguish sizes, shapes, and contours. He gradually develops the habit of noticing details quickly because a bird is here and gone again in the twinkling of an eye. Ear-training, too, is furthered. The cawing of the crow, the song of the robin, the chatter of the little chipping sparrow, and a myriad of other bird calls are each distinct and different. The child develops the ability to single out and concentrate upon one sound from among the many.

Strictly speaking, bird study with small children is really Nature study, as the attention span of a child is short and his roving eye includes everything in sight. But whether he is intent upon a warbler trilling in a shrub, or a frog swimming across a pond, he is absorbing knowledge.

A child is, at all times, brimming over with curiosity and questions. So often, in the more formal surroundings of the home, the parents are too preoccupied with their tasks to give more than a cursory answer to a child's questions. But how different it is in the fields and woods. There both parent and child are interested in the same thing. There is a feeling of leisure and relaxation that tends to bring child and parent into a closer harmony and fellowship. The wall that so often stands between mothers and fathers and their children melts away, and there is a free intercourse of thoughts and ideas. A wise and thoughtful parent can, at such a time, guide the conversation into any desired channel, and the child, in his receptive mood, absorbs the information eagerly.

The applied knowledge that the child unconsciously acquires while intent upon finding out the whys and wherefores of the thing at hand will become a permanent part of his mental storehouse. His intellectual appetite whetted by the bits of information he has already obtained, the child's alertness and power of observation increase. In the give and take of questions and answers, he develops his ability to describe what he has seen or heard. By the simple process of learning new words and using them, his vocabulary grows steadily, becoming especially enriched with those color-tones of language, the adjectives and adverbs.

A BIRD FEEDING STATION BRINGS THE BIRDS TO THE HOME AND BIRD STUDY TO THE YARD

Especially valuable is the companionship of father and child. The child is with his mother a greater share of the time, so most of his opinions are reflections of hers, and her standards and ideals, to a large extent, mold his character. Fortunate indeed is the child who has the personal attention of both his parents. To become a well-rounded individual a child needs the influence of both sexes. The father and mother, in a well-adjusted home, complement and balance each other, and when the child has contact with both, the effect is one of wholesome completeness. Unfortunately, under the present economic system, the average father has little or no time left over from his task as family provider to give enough personal attention to his children. So almost the entire care is left to the mother, with a consequent one-sided development of the child.

BIRD STUDY LEADS TO ALL NATURE, WHETHER IT BE A FROG IN THE POND OR A CHIPMUNK ON A FENCE

As a remedy for this unwholesome situation, the family jaunts into the countryside are invaluable. The father can become better acquainted with his children under the most desirable circumstances; the children learn to know their father as a likeable, interesting individual. The benefits of this companionship are beyond measure.

It is not necessary to confine bird study to field trips. Trees and shrubs around the home, a bird bath and a feeding platform will attract a large variety of birds. If the food is placed so that it is visible from a window the whole family can have entertainment by quietly watching their feathered visitors. This home study method is even better in one way than the field study. The protection of the window enables the observers to get much closer to the birds than is possible in the open, and the birds, busy with their feeding, stay within range of vision long enough for a leisurely observation.

The reaction of the different bird species to one another while at the feeding tray is interesting. The children soon notice the effects of each bird's actions upon the other birds, and the latter's reactions. The child discovers for himself that to have friends, one must be a friend. No amount of talking on the part of the parents could drive the lesson home as emphatically as this little demonstration by the birds.

Providing food for birds is an easy way to teach the child consideration for the needs of others. He learns, too, of the unexpected reward of happiness that comes to an individual who makes others happy. He learns that to be truly happy, one must forget self and think of others, a lesson whose beginning, at least, can be taught by the birds.

Home life that includes a common interest can be thrilling in contrast to the humdrum, daily routine type of living that exists in so many homes. Such an interest helps to make the difference between a home and a mere dwelling place. Children will feel much closer to parents with whom they have mutual interests. Upon the foundation of such a companionship can be built a bond of understanding that, later, may help to carry the child safely through the crucial adolescent period.

There are on the market a number of well-written, beautifully-illustrated books on birds. These make enjoyable and informative reading. As a solution to the rainy day problem they are most valuable. A child will spend considerable time turning the pages and looking at the pictures. And how exciting it is to find a bird that he knows! The book soon seems like an old friend. Friendship for one book is readily transferred to other books, and the child has discovered a new and engrossing world. The person who has learned what pleasant companions books can be will never be lonely. This particular lesson taught by bird study will be of value not only at home, but at school as well, because of the child's receptive attitude toward the idea of learning from books.

Even religion need not be overlooked in the pursuit of bird study. It would be a very insensible person indeed who would not experience a feeling of awe and reverence in the contemplation of the perfectly regulated forces of Nature. Children, almost as soon as they come in contact with Nature, begin to wonder and to ask questions about the guiding hand that must be behind all these miracles they see every day.

There are two benefits that the child obtains from bird study that are important for themselves alone, rather than for any lesson that they might teach. One, of course, is the healthful effects of long hours in the fresh air and sunshine. The other is the zest that a hobby adds to living.

Parents who have a mutual interest outside their daily occupations have found the key to more serene living. The minor irritations that can loom so large on a restricted horizon assume their proper proportions and cease to be irritating when the horizon is broadened to include fascinating hobbies. Inevitably, in such a home where the parents are content with life and with each other there is an atmosphere of harmony and a feeling of stability. Children cannot help but thrive in such surroundings. So even if the children did not participate directly in the parents' hobby they would benefit, nevertheless, by the parents' pursuit of the hobby. But the children profit so much more when they are included and the parents gain so much pleasure from the children's companionship, that it would be throwing away a golden opportunity not to share the hobby with them.

We are convinced that in the choice of a hobby to pursue with our children, we have chosen wisely. Through the study of birds we are being aided in developing our children physically, mentally, socially and spiritually. And perhaps, we may have started them on the road to real achievement. Who knows?

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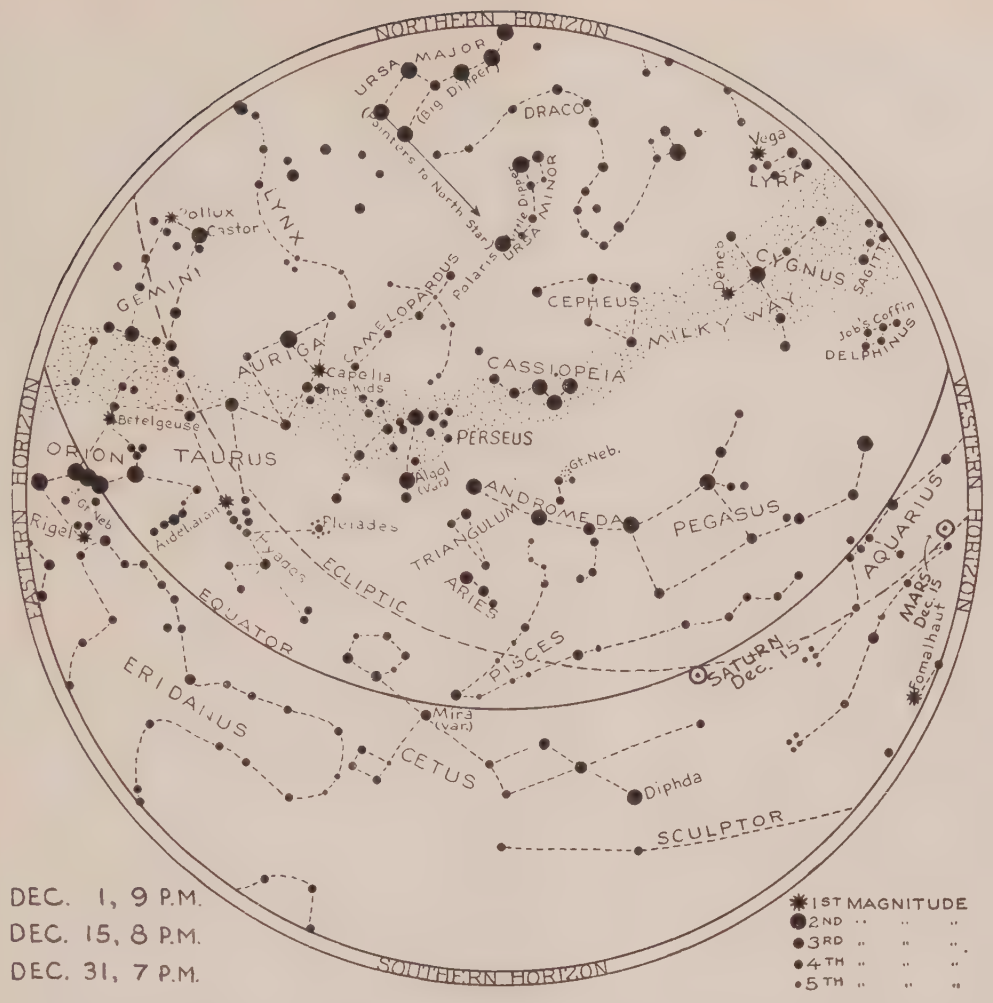
The Quarry

By LAWRENCE R. HOLMES

The air is full of death—
I am haunted by those melancholy eyes;
I can hear his struggling breath—
I see him trembling on the cold earth where he lies,
Too full of woe to plead, too weak with weariness to rise.
He can only lie and wait until he dies.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Supernovas and the Crab Nebula in Taurus

By ISABEL M. LEWIS

THE DISCOVERY of two supernovas by Dr. Fritz Zwicky at Palomar, California, the first on August 28 in a nebula distant 3,000,000 light years from the earth and the second on September 10 in a nebula more than 7,000,000 light years away, has aroused great interest in these remarkable phenomena. They are due, it is believed, to outbursts of giant or super-giant stars, while the ordinary nova is the result of some celestial catastrophe that involves one of the far more numerous class of dwarf stars to which our own sun belongs. The appearance of a supernova is such a rare phenomenon that the discovery of two within an interval of less than two weeks is all the more remarkable. In nebulas, though, that are at distances of millions of light years from our galaxy, it is only the most brilliant of stellar objects that would be observed individually, and a supernova is intrinsically the most brilliant of all celestial objects even though its splendor fades away in a few days. Ordinary novas at such distances would be too faint to register on the photographic plate.

It is interesting to recall that in April of this year N. U. Mayall of the Lick Observatory published an article in which he discussed the results of measurements of the Crab Nebula in Taurus. They show that this nebula is expanding at a rate that suggests that it may have originated from a brilliant temporary stellar object whose appearance in this part of the heavens in the year 1054 A. D. was recorded by the Chinese observers. At the rate at which the Crab Nebula is now expanding, it would have taken approximately nine centuries to attain its present dimensions. Observations show that the Crab Nebula is at a distance of 1500 parsecs (4,900 light years), so

only a supernova could have produced the observed phenomenon of 1054 A. D. An ordinary nova would have been, at that distance, only barely visible to the naked eye and certainly its appearance would not have attracted the attention of the Chinese observers, while a supernova would have been nearly as bright as Venus at the height of its outburst and could not have escaped notice. Many novas in their later stages have been seen to be surrounded by an expanding nebulous shell. Planetary nebulas, oval masses of faint light with a faint central star, are believed to result from the outbursts of certain novas. A planetary nebula may, possibly, produce eventually a planetary system, but its name does not come from that fact but from the fuzzy appearance of the object in the telescope that resembles the disk of a planet out of focus.

A nebula such as the Crab Nebula in Taurus might be the result of the outburst of a supernova and the ejection of matter from the star that would expand gradually to great dimensions.

The supernovas seem to differ from ordinary novas only in their maximum brilliancy, which averages about two thousand times that of the ordinary nova, and in the velocity of the ejected material which is estimated to be, on the average, about 3,750 miles per second or four or five times that of an ordinary nova. A dwarf star the size of our own sun and equal to it in brightness would appear as a faint star of about the fifth magnitude, barely visible without the aid of a telescope at a distance of ten parsecs, which is equal to about thirty-three light years. If, as a result of some great celestial catastrophe, this star should suddenly become a nova, or temporary star, it would appear to us at that distance to be more than six times as bright as Venus at her best and would be easily visible in broad daylight. It would give forth more than 25,000 times as much light as the sun at its brief period of maximum brightness. A giant star, such as Capella, with a diameter roughly ten times that of the sun, if it experienced such an outburst, would belong in the supernova class with a brightness averaging about 50,000,000 times that of the sun or 2,000 that of an ordinary nova! At the same distance of 33 light years, instead of appearing to us about five or six times brighter than Venus, it would be about five times brighter than the full moon and the night sky would be flooded with its intense radiance. Of the comparatively few outbursts of novas that have been recorded in history up to modern times, it is probable that only one or two were in the class of supernovas. The star Nova B Cassiopeiae, better known as Tycho Brahe's star, appeared in the year 1572 and was for some days as bright as Venus, though probably at great distance from the earth, and is believed to have been a supernova. The brilliant stellar object chronicled by the Chinese in 1054 A. D. was probably also a supernova and may be still visible to us in the form of the expanding Crab Nebula in Taurus. Ordinary novas, it is now known, occur in considerable numbers, though it was once believed that they were very rare phenomena. Thanks to photographic records of the heavens such as are kept at the Harvard College Observatory and elsewhere, and the constant surveys made of spiral and other nebulas far beyond our galactic system, few novas, whether telescopic or naked-eye objects, escape the vigilant eye of the astronomer. So common an event is the outburst of a nova in the heavens that it has been estimated that every star at some time in its history has passed through the nova stage; some stars probably several times. The actual cause of the outburst of a nova is still in doubt, however. It may occur as a result of some change within the star itself, or be due to an encounter with, or close approach to, some external substance, star, meteoric mass or swarm, or nebulosity. Novas occur not infrequently in spiral and other nebulas. Several supernovas have been observed in nebulas exterior to our own galactic system of stars. One of these was the star S Andromedae that appeared in the Great Andromeda Nebula at a distance of about 900,000 light years from the earth in the year 1885. It is one of the most brilliant of the supernovas and even at this tremendous distance appeared as a star of the seventh magnitude easily visible with an opera glass. Novas that appear in our own galaxy seem to favor places where the intensity of light is low, as at the borders of the Milky Way or near the numerous coal sacks or dark lanes. It is possible that they are associated in some way with nebulous matter in the universe, both dark and luminous.

In this month of December, Saturn will be seen to advantage in the evening sky. It will be in quadrature with the sun on December 20, when it will be due south at sunset, and will set at midnight. This is an excellent time to view the planet telescopically, and to view the rings that surround it at its equator.

Jupiter is not well situated for observation this month as it is low in the southwest and sets about three hours after the sun. Mars passes from Capricornus into Aquarius this month and is visible in the southwest in the early evening. It is reddish in color and equal to a first magnitude star in brightness most of the month. Mercury will reach its greatest apparent distance east of the sun on December 12. This is not a favorable elongation as the planet sets about an hour after the sun in the southwest on that date.

Venus is now approaching the sun in the morning sky. It rises about an hour before the sun and is quite low in the southeast.

The sun will be at the winter solstice and winter will begin in the northern hemisphere on December 22 at 1:22 A.M. Eastern Time. This will be the shortest day of the year in northern latitudes and the longest day in southern latitudes.

WILLIAM L. FINLEY CAUGHT IN SLIGHTLY UNCONVENTIONAL POSE ON A FIELD TRIP

THE BIG GAME PARADE

A new lecture entitled, "The Big Game Parade," illustrated with five dramatic reels, will be presented throughout the country this winter by William L. Finley, Field Naturalist of the American Nature Association. A thousand thrills are recorded in these pictures made while shooting with the shutter the largest and wildest animals of America.

Mr. Finley's motion pictures are attractive, informative and entertaining. He has been associated with Arthur N. Pack, President of the American Nature Association, in many field expeditions under the auspices of the Association.

Bill Finley and Art Pack have trailed bighorns, caribou, and bears in the wilderness areas of British Columbia and Alaska. They have stalked mountain goats, elk, moose and mule deer in the Rockies. Some of the best shots of pronghorns or American antelopes, as well as various species of smaller mammals and birds, have been taken by hiding in ingenious blinds for days at a time. Getting personal with mountain lions in the wilder sections of Arizona and New Mexico was a ticklish experience.

The greatest parade of the most exceptional wild animal in America, the silver-tip or grizzly, is a display of more than fifty of these mammals as they lumbered down the trails to the feeding station on Otter Creek near the canyon of the Yellowstone.

Another motion picture lecture featured by Mr. Finley is "Woods, Waters, and Wildlife," covering the main problems of conservation in the United States.

Further information regarding these lectures can be obtained by writing William L. Finley, Route 10, Portland, Oregon.

Rose Growing

A new edition of *How to Grow Roses,* by J. Horace McFarland and Robert Pyle, has come to hand. In this volume rose enthusiasts will find concise and practical advice that answers every question about the planting, growing and caring for roses. It is excellently illustrated with color photographs and descriptive line cuts, and is available from The Macmillan Company, publishers, New York, for one dollar.

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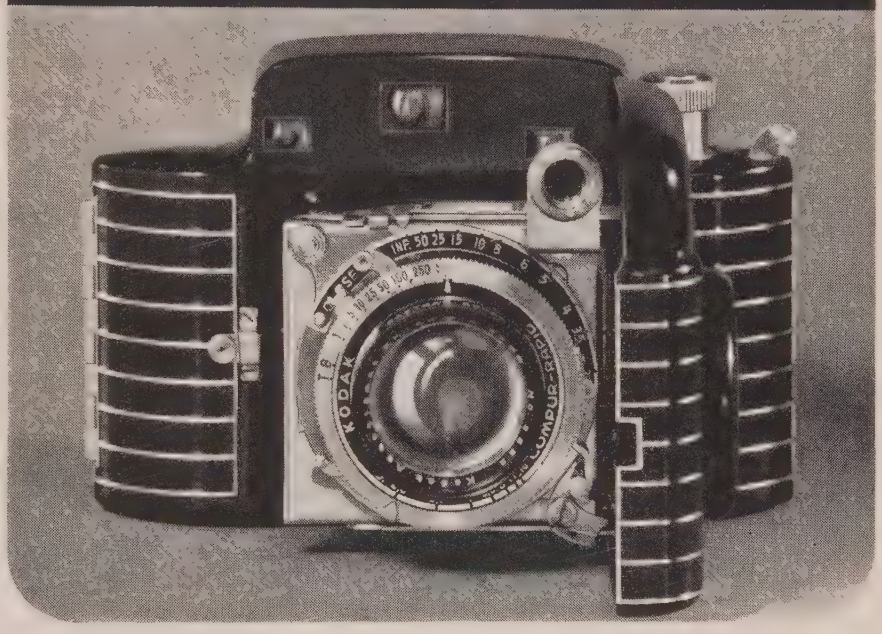

GIVE A FAN a Kodak Bantam Special—and you open up a whole new world of picture taking for him.

He ignores bad light, difficult conditions; shoots, as a matter of course, pictures he never before dared tackle . . . "off-guard" shots of romping youngsters, pets at play—action-packed sport scenes—landscapes in early morning mist—close-ups on rainy days—indoor snapshots under Mazda Photofloods—theatre and night club shots.

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In addition to black-and-white pictures, Kodak Bantam Special, loaded with Kodachrome Film, gives gorgeous full-color transparencies, to be viewed as they are, or mounted in slides for large-size showing in the Kodaslide Projector.

ONLY EASTMAN MAKES THE KODAK

KODAK Bantam Special

Readers of Nature Magazine carried off many of the honors in the National Garden Guide garden picture contest conducted this year through Nature Magazine, Christian Herald, Parents' Magazine and Boys' Life. Florence Hartman, a Nature Magazine entrant, won first award with the picture at the right, which should be reproduced in color for real effect. She lives in North Lima, Ohio. Second prize went to Christian Herald entrant J. H. Johnson, Shenandoah, Iowa; third to Robert V. Hill, Kent, Ohio, Parents' Magazine reader; fourth to Edward Allinger, Boys' Life entrant of Lakewood, Ohio.

Nature Magazine readers were prominent among the honorable mention winners. They were: Florence M. Crane, Hilton Village, Va.; Edward C. Day, San Anselmo, Cal.; Mrs. E. W. Foster, Meriden, Conn.; Mrs. Ilga Herrick, Brockton, Mass., whose entry is printed below; Mrs. J. B. Klein, Anchorage, Ky.; Russell Steinmetz, Monocacy Station, Pa.; and Mrs. T. A. Wolfe, Shickshinny, Pa.

Congratulations to one and all.

GARDENS! GARDENS!! EVERYWHERE!!!

By GEORGE L. ALPERS, *Chairman Judges' Committee, National Garden Guide*

TRULY the judges in the National Garden Guide Contest were confronted with a problem when the flow of entries had stopped. Accompanied by brief descriptions of the contents of the gardens, there were photographs of every description—colored prints, candid camera snapshots of floral personalities, panoramas of gardens, and a group of progressive shots showing the garden as it grew. For the most part pictures were of the smaller type of garden whose owner lives intimately with it. Some were formal, some casual; some were rock gardens, some included vegetables. All were interesting.

Thus the task of studying each photograph and its accompanying response blank was not an easy one. The process of eliminating pictures down to the point where real selection of awards could be made was even more difficult. Finally, however, the choice narrowed down to eight, to six, and then to the four that would qualify for the major prizes of fifty, twenty-five, ten and five dollars. The results are announced elsewhere on this page, and the judges found solace from the fact that some excellent pictures that had to be set aside were given recognition through the provision for honorable mention awards.

The first-prize garden of Florence Hartman was one in which natural beauty had been enhanced by splendid and careful planting. It reflected its owner's interest in the study of the habits of the plants and in color combinations. Space does not permit a description of the amazing variety of plants in the garden.

The second-prize garden was essentially formal, with roses predominating and a central vine-covered summer house providing a focal point. The third-prize garden showed an imaginative manner of fitting a small building into the garden scene and making it belong there. The winner of the fourth prize is a Boy Scout who stamped himself as an able gardener by successfully laying out and growing the Scout Emblem in full color.

The fact that so many entrants awarded honorable mention were members of the American Nature Association and readers of Nature Magazine was most gratifying. This emphasizes both the active garden interest of its readers and also their ability in the field of lens and shutter. It is testimony to the active garden interest of Nature Magazine readers, although it is, we suppose, to be expected that lovers of Nature and the outdoors should prove particularly adept and interested in gardens. In these awards we have ample proof of this.

Another interesting phase of the contest lay in the photographic angle. It brought out the interest and value of pictures of the garden from year to year and at various times of year. It emphasized the use of such pictures as a reminder of last year's mistakes and successes. With the perfection of color films, the possibilities of beautiful garden picture records are limitless.

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Audubon

Truly a distinguished addition to biographical works on John James Aububon is *Audubon* by Stanley Clisby Arthur. After Dr. Herrick's book, and some recent entertaining, popularly-presented and, perhaps, somewhat less well-authenticated volumes, one might wonder why there need be another. Mr. Arthur's book is its own justification. Upon its preparation he has lavished uncounted hours of research, poring over family letters, documents, journals and other Audubonia placed at his disposal. To the writing Mr. Arthur has given a simple, straightforward style that has captured the strange and fascinating character of his subject. Throughout the book Audubon himself is quoted many times, and in a way that carries forward the flow of the narrative instead of retarding it by the too-frequent use of footnotes.

It may be partially imagination, but it seemed to us that those parts of the book treating with Audubon's frequent sojourns in New Orleans and its vicinity were the finest. Formerly director of the Division of Wild Life of the Louisiana Department of Conservation, Mr. Arthur came to know New Orleans intimately, a fact that seems to lend color to these chapters. Not that the entire book is not colorful without attempt at a highly literary style. In fact, one of the great values of the book is that its author is concerned with facts and is not playing with words that will dramatize his subject, who was dramatic enough without benefit of adjectives.

Mr. Arthur does not, of course, subscribe to the "Lost Dauphin theory" of Audubon's origin, tempting as it is. He does, however, in two appendices, recount the details upon which this theory was based, and discusses the place and circumstances of Audubon's birth. An excellent bibliography of the woodsman-artist's works, a list of plates in the original issue of *Birds of America,* and a competent index make this volume complete.

Here, indeed, is a book worthy of addition to one's library; a book that is of outstanding merit and interest. It is published by Harmanson, 333 Royal Street, New Orleans, La., and its price is five dollars.

Animal Treasure

Not since *Bambi* has an animal book received the acclaim, attention and reading that *Animal Treasure* by Ivan T. Sanderson is currently enjoying. Chosen as a Book-of-the-Month Club book, it differs widely from the gentle story we found in *Bambi.* Here we find a story of adventure and excitement in tropical jungles, where Mr. Sanderson went from the bleak conventions of childhood Edinburgh, Scotland. He did not go, however, primarily to capture and bring back specimens to be locked up in zoos, or to seek out material for lurid jungle motion pictures. Mr. Sanderson was interested in finding out how the birds and mammals and other jungle forms live in their natural habitats. His was a scientific purpose and from British West Africa he brought back data that form the basis for a volume that is fascinatingly written as well as valuable for the information it contains. Mr. Sanderson is likewise an artist, and his own illustrations add much charm to his book, which is published by the Viking Press, New York City, at three dollars.

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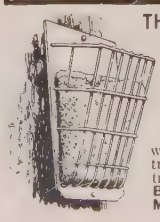

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Nature Magazine in School

A Department of Aid to the Teacher

In order that teachers and parents may further use Nature Magazine as an aid to the study of Nature and Science, this page is devoted to the following brief notes based upon articles in this issue and suggesting ways in which they may be used as a source of inspiration and information. To bring these Nature study thoughts to our readers we have obtained the services of one eminently qualified for the task, and this department is edited

BY ESTHER SCOTT

Instructor in charge of Elementary Science
Washington, D. C., Schools

Wild Sentinels

Are wild creatures the only ones to post watchmen?

Before reading this most delightful article, pupils in rural sections could be on the alert to see signs of sentinel duty being performed by domestic creatures, such as chickens, cows and sheep. In cities they could observe the action of a flock of sparrows or other birds in a park or vacant lot, noticing which bird was the first to take alarm and whether this bird had been watching for the approach of some danger.

•

Know the Evergreens

December, with its bright lights and festoons of green and red, ushers in the season when school children will enjoy discussing evergreens, reindeer and snow. In considering the evergreen, interesting topics for study might be: the adaptations of evergreens to less favored habitats, their part in preventing soil erosion, and needed conservation. In such a program the identification of specimens is not the goal of instruction but specimens should be referred to by their correct names so pupils will learn some of the more common ones. This learning may be facilitated by the use of a key made by the pupils for their own use. The geographical distribution of the evergreens mentioned in this article could be painted on a map drawn by the pupils and might be developed into the background for a calendar. The evergreen forests of the United States and Alaska could be represented on a sandtable, and used as the beginning of a study of forestry to be carried on in the new year.

•

Head-hunting

As we survey the literature of our profession, we teachers can not help being impressed with the lack of sensitivity to the need of conservation of wild life. Excellent books dealing with activities will recommend the collecting and mounting of small mammals for display in school museums, and some even suggest birds for this purpose. Among the teachers who read Nature Magazine there are those who have developed successful units dealing with this question of head-hunting. Perhaps we could work out some kind of a clearing house for these units. Leaving the scene of education and taking up the problems that confront the landowner, I trust that a personal experience will be pardoned. Early in September, two weeks before the squirrel season opened, I heard a shot in our meadow. I arrived there a few minutes later with my German shepherds. The hunter had fled, no doubt because in front of him, in plain sight, was a sturdy sign forbidding hunting and trapping. The dogs found the wounded squirrel at once. It was a merciful release, for the poor little creature had both eyes shot out. A white hot fury enveloped me as it died in my hands and I realized that it was one of the only pair we had left. I could have tracked the hunter with the dogs, but, as I suspected he had a car, I was soon in mine driving through back roads hoping to meet him coming out of a neighbor's place.

As a result of my squirrel experience, I approached my neighbors to ask their cooperation in posting their places against hunting, and was amazed to find that they felt just as I did. We would so much rather have the creatures of the woods than the hunting, so we closed fifteen hundred acres and posted patrols. You could do it, too, even if your state does not print "No Hunting" signs and you have to go, as we did, to a nearby city to purchase them.

•

The Black Witch

The fanciful journey of Santa Claus from his toy shop at the North Pole is not more strange than is the idea of the distance covered by this remarkable moth. Pupils who are interested in collecting insects will find this article full of excellent suggestions, as was *A Peep at Polyphemus* written by John Willard Baechle in the November issue of Nature Magazine. These two articles give a complete picture of how to raise caterpillars for study. Teachers who have cocoons, chrysalides and egg cases in their schoolrooms should remember to place these outdoors where they will be subject to the cold and the dampness, lest the inmates emerge too soon.

•

The Last Chicken Hunt

One who has seen the mounted specimens of the prairie chicken in a life-like setting at the Museum of Natural History in New York will feel a deep sense of regret that he may never again see these birds alive on the prairie. One who has recently visited the prairies will recall his feeling of disappointment as he realized that even in the less thickly settled regions of the West there is a scarcity of birds and mammals in places that only fifty years ago were teeming with wildlife. We must recognize that the spirit of ruthless destruction of wild creatures that characterized our pioneer days persists today, and to combat it we must employ every means at our command. Such stories as this arouse one's feelings. Similar stories dealing with other rapidly disappearing or extinct species could be collected in connection with the study of American History. Assembly programs might be presented to the whole school, using such stories as the basis for a play, or a series of tableaux or panel discussions, in which historic personages gave their viewpoint, followed by the discussion of actual conditions as they exist at the present time.

•

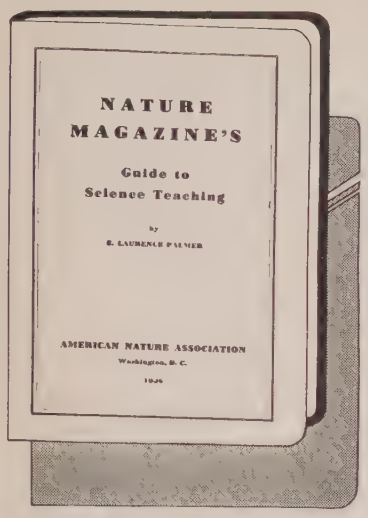
Parents, Children and the Outdoors

This article suggests excellent advice not only for parents but for teachers also. A distinguished educator in one of our foremost teachers' colleges once told the story of a young woman who went into a rural neighborhood noted for its difficult children. She reached her young pupils not through the usual book subjects but by means of their common interest in the outdoors. The woods and ponds were explored and some of the creatures that could be made comfortable in the school room were brought into it. Through this interest she gained the confidence of her pupils and led them to explore some of the more common school subjects.

•

Supernovas and the Crab Nebula in Taurus

There is a vast difference between the sun-centered universe of the time of Columbus and the one that we now know. Tracing changing beliefs held from the dawn of history to the present time concerning the age, shape and size of the earth, its relation to the sun and other heavenly bodies, the extent of the galaxy and the existence of other galaxies far beyond our own, serve as convincing evidence that man's ideas of what constitutes truth are constantly changing. A play might be written and dramatized by older pupils giving the historical setting of these beliefs, such as Columbus pleading before the courts of Ferdinand and Isabella of Spain, where arguments could be advanced concerning the shape of the earth and its size. Information would have to be looked up concerning the work of the Chinese astronomers, the theories of Ptolemy and the generally accepted beliefs of the Spanish at that time. Pupils who can grasp the meaning might arrange a series of scenes or tableaux showing the astronomers who have recorded the novas and supernovas, indicating the significance of these discoveries to the people of the time, climaxing the presentation with what we dimly see today and leaving the audience with the feeling that we do not now know all there is to learn. In connection with Christmas, it is thought today that the Star of Bethlehem was a nova that suddenly burst forth.



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"I think that in general it is a very fine piece of work. It is very valuable for showing how otherwise unrelated pictures and experiences may be used for particular purposes, thus preventing the work from becoming haphazard and incidental." Dr. Victor L. Crowell.

"The approach to this subject is superb and the subject matter of high quality." Dr. W. H. Davis.

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Grassroot Jungles

Edwin Way Teale's outdoor hobby is insect photography. Over a period of years he has accumulated several thousand negatives of insects in as many different poses, some of which have appeared in NATURE MAGAZINE. As a result, he is as familiar with the ways of the insect world as most of us are with the habits of our next-door neighbor. Mr. Teale's new book, *Grassroot Jungles,* takes the reader on a voyage into this world of insects; on an extensive field trip where the magnifying glass never fails to turn up something new and interesting. Not a textbook, the volume is meant for those interested in the world we live in; for those interested in exploration who haven't the time to hie themselves off to the jungles of Sumatra or the Siberian steppes. For, in the grassroot jungles of your own back yard, is this wonder world where strange and incredible forms of life can be observed. Here are found peculiar creatures that change their skeletons from week to week; here are found carpenters, tailors, herdsmen, warriors, architects, undertakers and weather prophets. Illustrated with 130 of Mr. Teale's best insect photographs, *Grassroot Jungles* is available from Dodd, Meade and Company, New York, publishers. The price is $3.75.

Nature School Texts

Under the group title of *Nature Science Series,* Noble and Noble, New York, have brought out a new set of school texts, the joint work of Dr. Clyde Fisher of the American Museum of Natural History, and Marion L. Langham, teacher of Nature study in New York City. Two of the books—*Our Pets* and *On the Farm*—are designed for primary grade use. The other four—*Our Wonder World, Ways of the Wild Folk, World of Nature* and *In Field and Garden*—are for grades three to six. Each book is divided into two parts, the first part treating with subjects common to the fall and winter; the second with spring and summer. To add interest and broaden their use, correlated stories, legends and poems have been included. Questions that provoke thought conclude the treatment of each subject, and pupil activities are suggested. Excellent illustrations add to the physical and practical value of the series. The price per volume is ninety-six cents.

Weather

The fourth unit in a series of Natural History Studies being published by Hugh F. Newman and Company, Los Angeles, is entitled *Weather.* In this volume, the author, Gayle Pickwell, Professor of Zoology at State College, San Jose, California, unfolds the story of the weather not only with vivid words but also through the medium of more than fifty full-page photographs that depict the weather in its various forms, from the swirling tornado of the plains to the softly settling fog of a mountain valley. The causes of weather are explained, as are the steps man is taking to control its dust storms, droughts, floods and erosion. Included also are interesting data that can make anyone an amateur weather prognosticator for his own locality. The volume is priced at three dollars.

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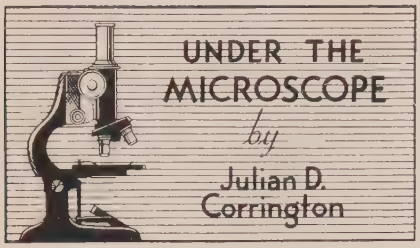


Paper

Examination of paper under the microscope invades a number of separate fields of interest. The criminologist may wish to trace the source of paper on which a ransom note is written; the paper manufacturer wants to find out if the particular type of fiber he is using imparts the necessary strength to his product; the engraver seeks to determine the best finish of paper to reproduce his four-color process plates. For the general student of microscopy, paper constitutes an important and intriguing chapter wherein materials are identified and correlated with use.

The paper industry is a huge one indeed. Think of all the items we read, from books and magazines and newspapers, to posters, advertising pamphlets, catalogs, broadsides, blotters, sheet music and what-not—even an occasional bank check, bond coupon or ten-dollar bill if we're lucky! Consider the tons of paper consumed daily in cigarettes, photographic and art work, bags and sheets of wrapping materials, wall paper, boxes and cartons, the various wall "boards" so popular in the building trades today. We even read of paper clothing and shoes and of furniture and railroad car wheels, along with countless other fabricated items. It could truly be said that the use which man makes of paper is an index to his stage of civilization. Paper, then, is well worth looking into, particularly through the lenses of a microscope.

With the foregoing in mind it is surprising to reflect that man is not the inventor of paper, the art of manufacturing a thin sheet out of wood fibers having been discovered by wasps long ages ago. No better introduction to the microscopy of paper could be suggested than to seek out an abandoned nest of any of the paper-making wasps or hornets, and then to clip a square of about one-half inch, soak it in xylene for a few minutes and mount it in balsam on a slide. The various types of wood fibers which the wasp has bitten off from old fence posts and rails, dead trees and stumps, has moistened and chewed into a pulp and has then pressed out into a thin sheet, are recognizable and will reveal their sources to one trained in the determination of these fine plant elements.

Not only is it true that this manipulation by the wasp does not destroy the fibers, but it is far more amazing to read of the terrific punishment that man-made papers can take during their manufacture and still show under the microscope structural units that the observer can accurately determine and classify. They may be ground up, beaten, heated, treated chemically with various caustic solutions, liquefied, pressed out into thin sheets while still a hot, milky mass, and yet the individual fibers of the finished product will retain more or less of their integrity—indeed, they must in order to impart a combination of flexibility with cohesion and strength, the basic requisites of a good paper.

It is suggested that you make slides of bits of various papers by the same simple procedure mentioned for wasp-nest paper, and then study these with an eye for comparison. Try newsprint, bond, tissue, wrapping, rice and other papers, and under reflected light examine unmounted bits of corrugated or carton paper and wall board. Aside from more or less formless debris, the most conspicuous elements present will be either solid *fibers* or hollow *vessels* or both, depending on the material. Some experience is necessary to distinguish all of the many ingredients found, but one soon learns to tell cotton, flax (linen), jute, hemp, esparto and other herb fibers from each other and from wood fibers of the various trees used in making papers, as spruce, fir and poplar.

The finest bond papers come from linen rags, collected by the junkman, while the presence of any considerable quantity of cotton fibers in such a specimen is a sign of adulteration and a cheapening of the product. Jute and hemp yield the tough brown papers so widely used in bags and wrapping sheets; newsprint is tree pulp and tissue paper is largely cotton. Every notable manufacturer of paper employs one or more microscopists to check on quality and to undertake researches looking toward improvements. There are trade journals and technical works written on this subject, especially in conjunction with textiles—something for us to consider a bit later. Accordingly paper microscopy is an important subdivision of the science and one which every student should examine at first hand, at least so far as the main essentials are concerned.

Advanced Hints

Instead of limiting studies of paper to the foregoing, try one of the beautiful and interesting *microchemical tests* for the identification of components. Procure samples of various papers and in each case tear or chop into fine pieces then boil in water, meanwhile stirring with an egg-beater until a fine pulp results. Wash and drain in a small-meshed tea strainer held under a faucet, then place a small quantity of this wet mash on a microscope slide and tease apart with needles into a thin film.

There are many stains employed in this work, that of *Sutermeister* being excellent as a starter. Prepare the following solutions:

1. 1.3 grams iodine and 1.8 grams potassium iodide dissolved in 100 cc water.
2. A clear, practically saturated solution of calcium chloride in water.

While your spread film of paper pulp is still wet, apply solution 1 and allow to remain for one minute. Remove excess stain by blotting, then apply solution 2 for one minute, blot excess, dehydrate with alcohols, clear in xylene and mount in balsam. Results:

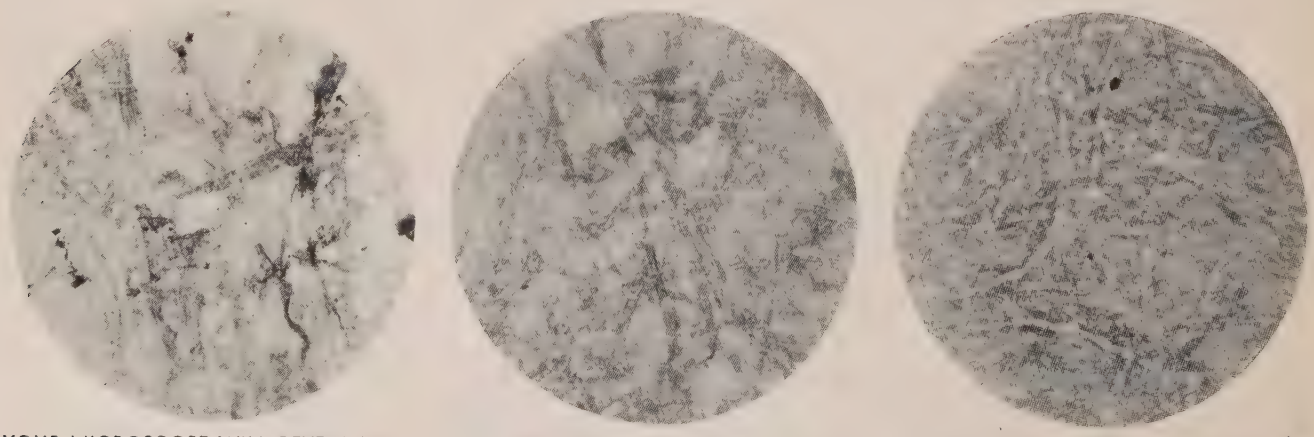
Red or brownish red—cotton, linen, hemp.
Dark blue—bleached soda pulps from hardwoods.
Bluish or reddish violet—bleached sulphite fibers and thoroughly cooked unbleached sulphite fibers.
Greenish—jute, Manila hemp.
Yellow—groundwood.

This is a delicate test, so don't be discouraged if you have one or two failures; practice until success perches on your eyepiece.

Beginner's Primer

Just what is included in the so-called science of microscopy? Used in a broad sense it must be admitted that this is a catch-all and highly omnivorous science, to be sure, since every one of the legion of modern sciences uses the microscope in some capacity and hence enters within the far-flung provinces of the microscopist.

First of all should be listed the science of *optics,* a division of physics that includes study of the properties of light and especially of its refraction by lenses. Here belong mathematical calculation of lenses and actual lens grinding. Secondly we must give high rank to *Microtechnique,* the science of preparing objects for microscopic examination and including such procedure as fixing, sectioning, staining and mounting various organic tissues. Third come the separate sciences, both pure and applied, which make up the subject matter surveyed under the microscope or some other instrument based on



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Physics—aside from optics, mentioned above, includes use of the spectroscope, refractometer and many other optical instruments in getting at the secrets of construction of all forms of matter.

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Technology—embraces all of the major industries—steel, rubber, paper, textiles, paint and on through a long list, all depending on the microscope for information as to composition and use.

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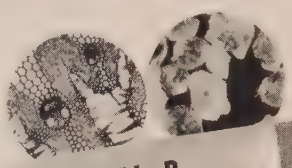

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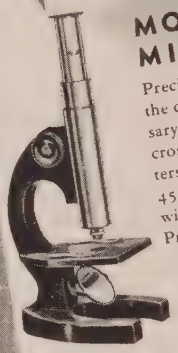

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Diana Thorne's DOG COLUMN

WHEN ONE considers the collie today it is impossible to do so without affectionate thought of Albert Payson Terhune, who has, in his writings, paid to this breed in America the same unforgettable tribute that Robert Burns and John Brown gave it in Scotland a century ago.

Of all dog varieties the collie is the one most closely, in popular thought, associated with the farmer and stockbreeder. He is par excellence that type known in show parlance as the "working dog", as opposed to the "fancy" or "sporting" varieties.

It is doubtful also (it is a matter of argument) whether he is not the most beautiful of dogs. He is certainly the painter's favorite; even if those types with more definite and evidenced muscular structure such as the greyhound and the great dane are the sculptor's selections.

In the cities and in the house (particularly in the city apartment) the collie always seems to me to be sadly out of place. But so does his cousin the old English sheepdog. However, as the years pass the appreciation of relative values seems to go increasingly awry.

The collie at his work in what are known as "sheepdog trails" is a sight that leaves everlasting impressions in the memory.

His intelligence in the special job to which he has been trained is uncanny and has to be seen to be believed. In the long days on moors and hillsides of the Highlands of Scotland I have seen him at his work, and the human shepherd had little to do but contemplate and ruminate, much as did his charges! The collie had the responsibility and carried it well and conscientiously and with complete success. A Scottish shepherd without his collie, or collies, would be as well equipped for his job as would a paper-hanger without arms!

The collie is, in the locale of his business, not the most sociable or comeatable of dogs! His mind is on his work, even in off moments. He has one job in life and the doing of that properly fills his mind. He has one master to whom he is devoted and between them little speech is needed and seldom given. A look and a gesture are quite sufficient.

Not far from Balmoral last year I saw a thing that never has been and never will be seen in America. I attended worship in a small "kirk" in which one-third of the small congregation were dogs--collies. There they lay, silent and cautious and attentive, dozing through the overlong exhortations in patient waiting on their masters' will; lying in the pews at their feet, in the aisles and in the open doorway. The preacher drew his scanty worshippers from the mountain cottages. Nearly all the males were shepherds. Not one could be induced to come if he were not allowed to bring his dog. No one dog in that two-hour service required an admonition to "be quiet". When I hear my next door neighbor plaintively telling her Pekinese to "Lie down!

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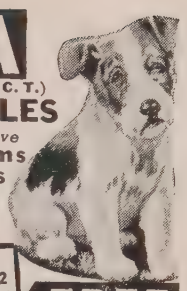

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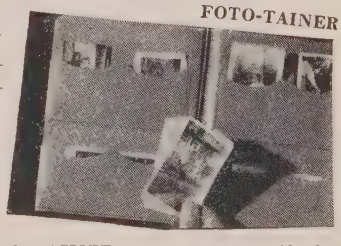

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Stop barking, will you?" I recollect that scene with unmixed emotions.

Fashions in dogs, as evidenced by the show rings, come and go—but the collie always will be permanent. He has had and will have a long day. Not for him ever, I think, is the sad fate of the pug, the beloved of our female great-grandparents.

The day is far distant, I hope, when on the plains and the mountainsides a radio-controlled robot will take the place of the collie in the safekeeping and herding of the lambs! At all events I am comforted by the thought that if that day ever comes, I shall not be here to see it!

These necessarily brief notes of character on the dog are obviously not vehicles for technical elaborations, which have been well and fully dwelt upon in textbooks and Breeders' manuals; nor has my consideration of the dog ever had as basis financial worth or show-points.

Therefore, so much, just now, for the collie!

INDOORS AND OUT

(Continued from page 327)

tainly the most perfectly written. When he traveled, his capacity for enthusiasm gave added importance to the resulting writings.

Where Rolls the Oregon and *"Sanctuary! Sanctuary!"* are both in a sense travel books, but more important is the fact that they are propaganda for conservation. Like some others of his generation and surely all of this one, Sharp found it hard to be a naturalist in America without being a conservationist. Among the first widely read praises of wildlife refuges are Sharp's "Three-Arch Rocks Reservation" and "On the Marshes of Malheur" in *Where Rolls the Oregon,* which also includes the prophecy: "Soon we shall all of us learn better how to live with the birds and other wild things, and let them live with us. We are only beginning to realize our deep dependence upon our wild neighbors, and the birds especially. As this knowledge grows, and as our love for wild life grows, we shall draw closer and closer together, we shall all share and share alike, birds and beasts and men, all the things we have."

In *"Sanctuary! Sanctuary!",* published 12 years later, in 1926, Sharp's pleas for conservation become more urgent and touched with pathos. "A fearsome thing," he says, "it is to see the passing of a race, the thwarting of a divine plan, the end of what had been intended for eternal years. Death we are used to, but not extinction." There is still a prophetic hope in his pronouncements, but the tone resembles, though remotely, that of the Biblical prophet calling for action. "The sole help of many a struggling wild form from now on," Sharp sees, "will be my help and your help. Since the beginning man has been, and for a long time may be, on the side of Time and Chance, against wild life. But the better man must prevail over the worse, the lover of life and beauty over the destroyer, the wise economist over the greedy, short-sighted waster; and this finer, wiser man will give to the polar bear, to the pitcher plant, to the mighty condor, his Arctic Circle, his Hingham meadow, his Sierra range for a perpetual home."

As always in my plans for the use of time, I see that my suggestions for the evening in December have already passed the bounds of possibility. And so far I have not even mentioned Sharp's biographies—*The Boys' Life of John Burroughs* and *The Seer of Slabsides*—or *The Spirit of the Hive: Contemplations of a Beekeeper.* The books *The Fall of the Year, Winter, The Spring of the Year,* and *Summer* have also been omitted, but they are all in *The Year Out of Doors;* and the unmentioned *A Watcher in the Woods* comprises selections from *Wild Life Near Home.* It is enough, perhaps, for this anniversary evening merely to think of these. There is one other book, however, that I should like to spend an entire evening with. It is *The Better Country,* a charming, familiar, and gently philosophical account of a lecture tour made to California by automobile, published in 1928. Perhaps the tone and worth of the volume are suggested by the fact that Sharp was still able to quote the verses he wrote as class-day poet on his graduation from Brown University:

> Beautiful old world,
> How large thou art, and free!

There is also one other general consideration suggested both by and in the books of Dallas Lore Sharp that I should like to make during many evenings. It may be hopeless, but I am reminded of my complaint to Dr. James Melville Coleman, the venerable philosopher who taught philosophy in my college days and had required a final paper stating my philosophy of life. "Dr. Coleman," I said, "I have spent much time on this attempt, but I can't write anything. I think it will take an entire lifetime just to discover what to write." He thought a moment, and then with remarkable common sense and academic courage he said, "Well, all right. Take it!" So it may be with this consideration of Dallas Lore Sharp and Nature writing.

A collection of representative sketches by six of the "most eminent American writers on nature" was published in 1909 with the title *In American Fields and Forests.* Besides Sharp the authors represented were Thoreau, Burroughs, Muir, Torrey, and Olive Thorne Miller. The anonymous introduction to the book points out that the work represents the literary outcome and the literary aspiration of the American Nature Movement, and as the most pertinent statement on the origin and significance of this movement quotes at length from an important essay on "The Nature Movement", in *The Lay of the Land.* John Burroughs in his famous article on "Real and Sham Natural History" had said that "of all the nature books of recent years, I look upon Mr. Sharp's as the best." Sharp thus spoke with prestige. In a later work he said concisely that the chief faults with American writings on Nature had been that many were dull, fanciful, or insincere. In his essay on "Tickle-birds and the Coccinelidae" in *Roof and Meadow* he made another pertinent statement: "I hardly know which state of mind is farther from the mind of the true nature-lover—the ecstatic, exclamatory one, that goes chanting rimes and verses like priests and spring poets, or the analytical, labeling mind, that scours the country with a book, finding out what Linnæus, Audubon, and Gray called things."

These considerations, it seems to me, are not only interesting but important. Certainly Dallas Lore Sharp was not dull, fanciful, or insincere. He was enthusiastic without being gushy. He once declared bravely ("Mother Carey's Chickens" in *Where Rolls the Oregon*): "I have learned many facts in the fields, but how many of my feelings have come to me out of books!" Yet his writings are not bookish, nor are there any insertions of the dry-as-dust sort. It is interesting to consider Sharp's work as part of an important literature still being written on Nature in America.

Such works as the recent *Fur-bearing Mammals of California* are also significant contributions to this literature, though of a kind differing from anything that Dallas Lore Sharp wrote. Entirely outside the bounds of belles-lettres, these two volumes by Joseph Grinnell, Joseph S. Dixon, and Jean M. Linsdale (U. of Calif. Press, $15) are essentially technical, yet such is the interest of the American public in natural history that the authors and publishers have kept an eye on the general reader. I have just read the work through, skipping, I must confess, much of the detailed information in fine print and finding special interest in the baker's dozen of color plates by Allan Brooks and the excellent photographs in the text, but at the same time taking much profitable pleasure in all of the main text.

As Dr. Grinnell suggests in his preface, the work is especially worth while for "having put on permanent record a mass of authentic natural history not likely to have been saved otherwise." The more extensive purpose is, however, indicated only a few lines further on in the statement: "Animal natural history, free from the tendency to read human motives and human ways of thought into the actions of the animals, free from the tendency to dramatize, and free from the influence of human prejudice, is, I have come poignantly to realize during the production of this book, exceedingly difficult to write." It is also significant to observe the recurring necessity for the authors to correct mistaken opinions or attitudes for the sake of conservation.

Preserving facts, writing authentic natural history, and urging conservation—these are still the outstanding objectives of American writers on Nature.

Of the 13 color plates, 11 of which include habitat scenes, I think I like best the one of Sierra Nevada black bears, partly because of the blue blossoms in its background, but largely for its action and its illustration of color phases. Thought of the black bear recalls winter to mind again, a thought pointedly suggested by this work's record of a miner who looked in on a black bear in a pile of rocks one December 10 and saw it "breathing slowly and regularly." One of the seven sleepers, the black bear can escape the snowstorm without missing it.

Shenandoah Park

No official National Park Service booklet has as yet been issued for the new Shenandoah National Park in Virginia, but the lack is well filled by an attractive and eminently useful booklet by Darwin S. Lambert, president of the Shenandoah Nature Society. This ninety-page booklet is entitled *Beautiful Shenandoah,* and has the approval of the National Park Service and a foreword by its director, Arno B. Cammerer. The booklet is attractively illustrated, and treats generally of the flora and fauna of the Park and its history. Particularly valuable is a travelogue of Skyline Drive through the Park and an excellent map. Copies of the booklet are available from Darwin S. Lambert, Luray, Virginia, for fifty cents postpaid.

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